TOOLING & PRODUCTION Magazine

JUNE 1958

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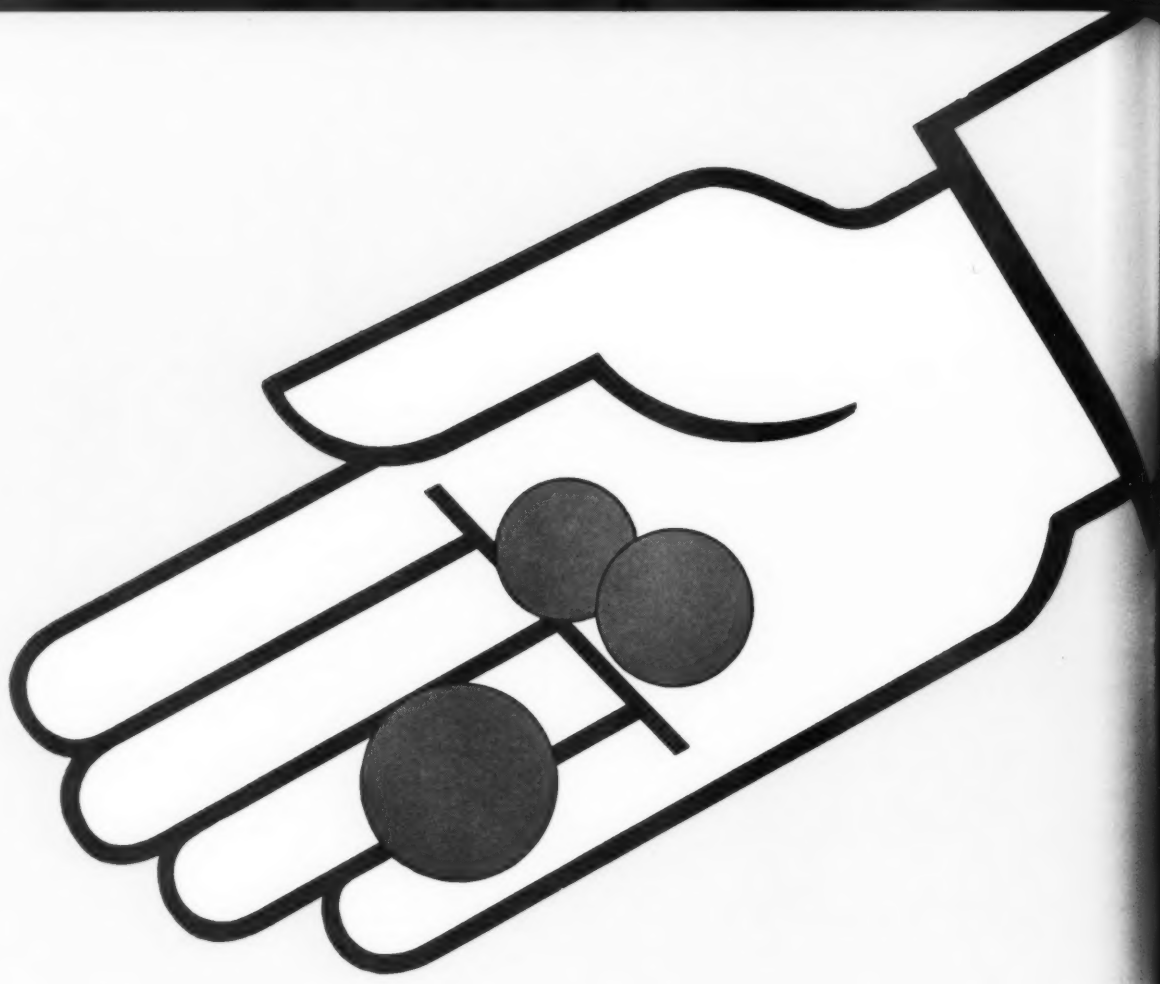
With "Electromate" to tell him what to do, and with "CedaSize" telling him what he has done, a semi-skilled operator can grind to ±0.000010". See page 47.



Still handing out pensions to obsolete machines?

CIRCLE INFORM-A-GRAM KEY NO. 2

Talk to

Snyder

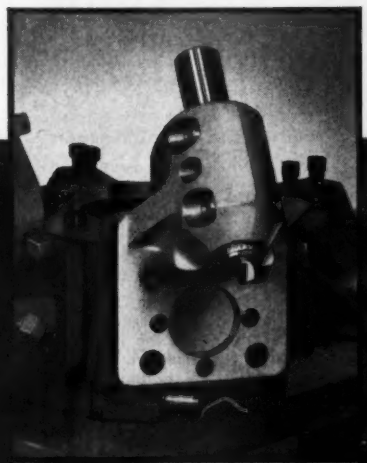
TOOL AND ENGINEERING COMPANY

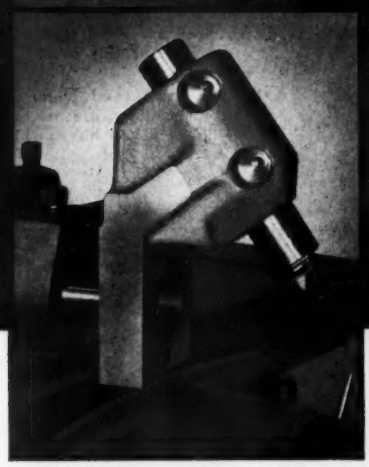
3400 E. Lafayette, Detroit 7, Michigan

Special Machine Tools with Automation for More Than 30 Years

new microbore turning heads feature speed, ruggedness, precision!

Flange Mounting Heads mount directly on the face of the turret providing extreme rigidity.





Shank Mounting Heads permit quick, easy mounting in the turret and maximum versatility.

STANDARD, GENERAL PURPOSE FOR ALL HORIZONTAL TURRET LATHES!

Rugged, rigid and adjustable in seconds, these new general purpose turning heads perform a variety of single and multi-diameter operations repetitively with unfailing accuracy. Microbore's exclusive micrometer vernier adjustment provides a fast, accurate means of setting the tool point over a wide working range. *0" to 4" for Shank or Flange Mounting Heads. 0" to machine capacity for Plate Mounting Heads.* Extreme rigidity throughout permits heavy stock removal while holding to closest tolerances. This combination of speed, ruggedness and precision reduces downtime, increases accuracy of the end product. Write for complete information.

See these new developments:

- **Pre-Set Tooling**
- **Tool Designers Layout Kit**
- **Flash-Change Bridgeport Spindle**
- **Turret Lathe Tooling**

DeVlieg® Microbore® System

DE VLIEG MICROBORE • DIVISION OF DEVLIEG MACHINE COMPANY

2720 West Fourteen Mile Rd., Royal Oak, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 3

PRESSURELOK®-224

RESINOID DIAMOND WHEELS

The *Best* Diamond wheel ever developed

- U.S. DIAMOND'S PROVEN REVOLUTIONARY "PRESSURELOK"® Process increases Diamond holding efficiency by 300%.
- Positively no danger of heating or cracking carbide with the most rapid stock removal.
- Use dry or with coolants.
- They are consistently super-finishing, out-producing, under-costing any other Diamond wheel ever produced . . . and they are always readily available.
- If you have used them, you know they are the best! . . . If you haven't, let us show you!

US

UNITED STATES DIAMOND WHEEL CO.
835 ILLINOIS AVENUE
AURORA ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 4

TOOLING & PRODUCTION Magazine

JUNE 1958
VOL. XXIV No. 3
GEORGE J. HUEBNER, Founder

PERSONALLY SPEAKING

Dear T&P Reader:

While we're all battling to restore full employment and prosperity for all, shouldn't we be giving much more thought to the unfortunates who are suffering through this period of recession? Unemployment compensation seems inadequate both in amounts of periodic payments and duration of them. Getting along on income reduced as much as 75 to 80 per cent imposes a real hardship. I know I wouldn't like it and I'm sure you wouldn't.

It seems as though now is a good time to plan for revising the unemployment compensation program. There is much reason to believe that our present program is actuarially unsound. The only way probably to correct the present system is to increase, substantially, the taxes which support and maintain it. This may well be one of the forms of taxation which can be accused of contributing to inflation. So, why not try a different approach?

It is smart and highly desirable for every employed person to have available for emergencies, liquid assets equal to six months' take home pay. Many of our citizens already have such reserves. Wouldn't the nation be better off if all have them?

Soon, according to the experts, our economy will move into another expanding cycle which should be of six to ten years' duration. Why not take advantage of this new, promised cycle by setting up a program requiring the regular building up of savings reserves? Funds could be deposited according to each person's own choosing. And most employers, I'm sure, would be willing to make payroll deductions for such a purpose.

The funds should be primarily for unemployment and they should not be withdrawn faster than six equal monthly installments. Some basis also might be arranged for use of funds in event of need due to illness, accident or other emergency. Also, funds might be borrowed against for use in acquiring a home.

Such a program would eliminate unemployment compensation. It would make all of our citizens solid and substantial with healthy reserves to fall back on. It would be an effective brake on inflation because it would have a tendency to prevent over-extension by people who can least afford it.

One objection to this whole program might well be the compulsion of it. But, compared to some of the compulsions we already have, it is an excusable compulsion because it would be such a favorable influence toward attaining a standard of economic stability that could not be attained any other way.

Cordially yours,

Ray Huebner

Publisher

READERSHIP Control RESEARCH — BPA

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Written especially for YOU

to help you solve your cutting tool problems

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Complete descriptions of Cemented Carbide, Cast Alloy and Ceramic Cutting Tool Materials.

Recommendations for their use.

Detailed information about the various products using these materials to help you cut your costs and increase your production.

Your big free copy is ready for mailing. Write today.

Manufacturers of:
Cemented Carbide and Tantung® Cast Alloy Cutting Tools, Toolholders and Milling Cutters

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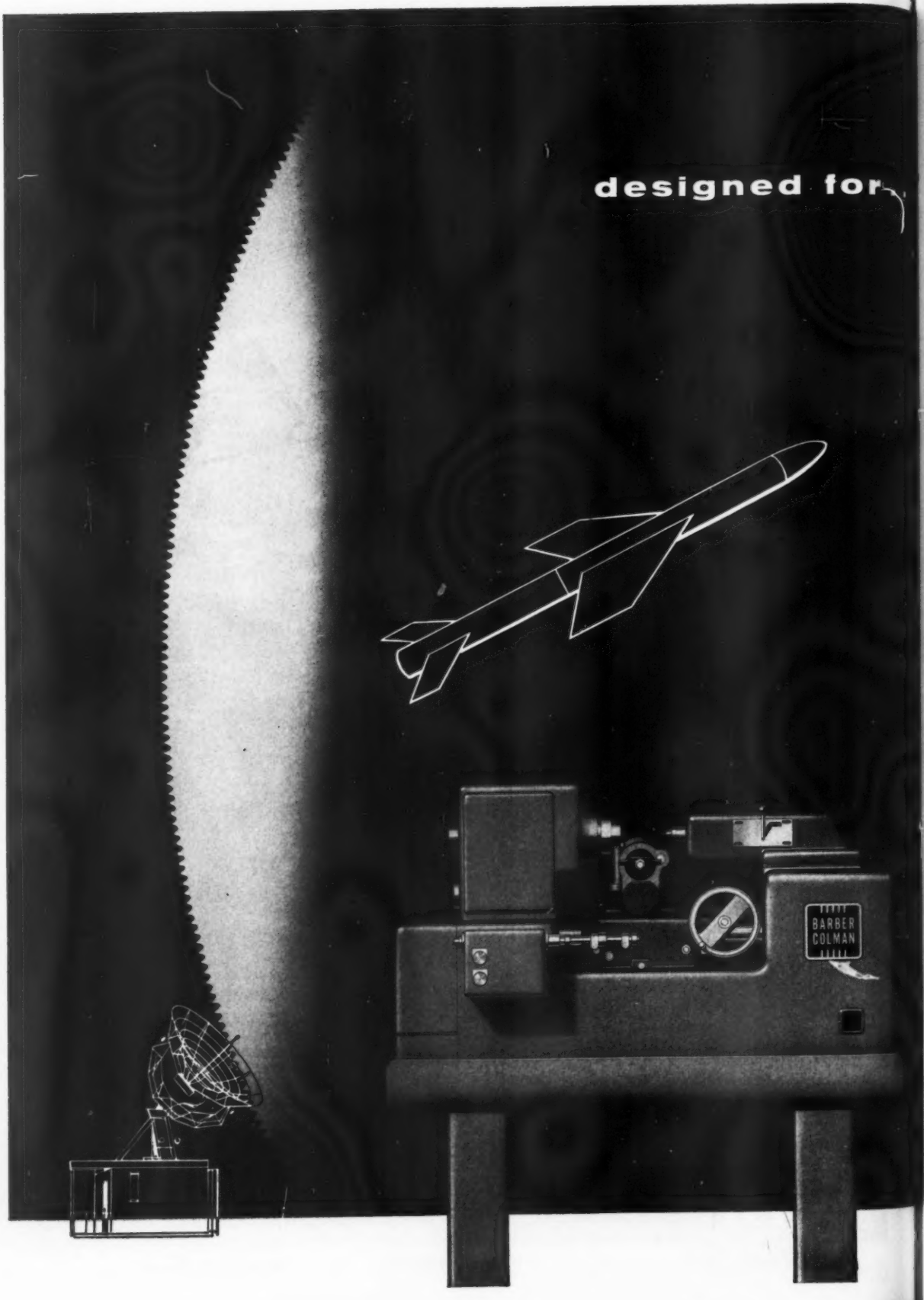

designed for
BARBER
COLMAN

..precision instrument gears

new Barber-Colman hobber guaranteed to index accurately within 20 seconds of arc

Barber-Colman engineers have developed a new hobbing machine which guarantees indexing accuracy suited to gears used for aircraft, missile and radar guidance systems. This machine is known as the No. 2½ - 4 hobbing machine and hobs precision spur gears up to 2½" diameter x 4" length, 30 D.P. in steel and 20 D.P. in brass. It provides accuracy, capacity and rigidity for precision fine-pitch work within a nominal price range.

One of the most important features of the new No. 2½ - 4 hobbing machine is the accuracy of relative rotation between the work spindle and the hob spindle which is guaranteed within 20 seconds of arc. This means that the spacing error on the gear caused by the indexing error of the machine would not exceed .00014" on a 2½" diameter gear.

The machine has a capacity for using 3" diameter hobs providing for a greater number of flutes to produce smooth gear tooth profiles. Using proper care in rigid tooling, accurate blanks, mounting of hob and work, and Class AA hobs with accurate sharpening, precision gears to Class 3 tolerances are hobbed with this machine.

Several design features are a departure from standard hobbing machine construction. There is no hob slide — only a hob carriage for conventional feed. In place of a hob slide, the hob arbor is mounted on a swivel which adjusts to compensate for hob thread angle. The work slide is stationary, and the hob swivel raises and lowers to meet diameter requirements. The machine has no overarm support, permitting greater work visibility and operator access. Both work and hob spindles are mounted in precision anti-friction bearings to provide accurate rotation at high speeds. The hob carriage also has anti-friction way supports, and the metal-to-metal contact afforded provides more rigidity than obtained with gib-type mounting An infinite number of hob speeds are provided without change gears in the range of 200 to 1200 r.p.m.

Rigidly constructed, with a steel weldment base and heavy grey iron machine bed, the machine is designed with a minimum number of parts at points where deflection and inaccuracies may occur. Net machine weight without tooling is approximately 1500 lbs. Standard equipment includes motor and controls and one set of change gears.

For complete specifications and data contact your nearest Barber-Colman representative, or write directly to the factory for a copy of new bulletin F-8642. Orders are now being booked for July and August deliveries.

BARBER-COLMAN COMPANY

7106 ROCK STREET • ROCKFORD, ILLINOIS

Hobs • Cutters • Reamers • Hobbing Machines • Hob Sharpening Machines

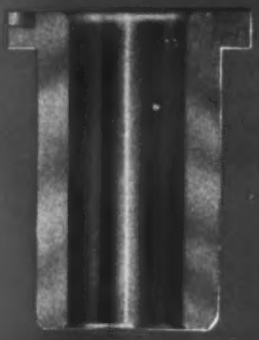
BARBER COLMAN

CIRCLE INFORM-A-GRAM KEY NO. 7

for accuracy in your production
it pays to specify

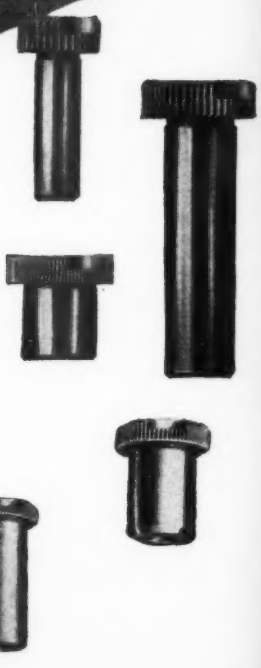
UNIVERSAL DRILL BUSHINGS

In Universal you get the best. Machined from finest quality steel. Blended radius on the top-inside diameter helps prevent tool hang-up and breakage. 100% concentricity and hardness tests insure accuracy and uniform quality. Knurled heads provide a quick, sure grip.



superfinish bores lengthen tool life

The superfinishing of Universal Drill Bushings is an important factor in keeping tool and bushing wear to a minimum—especially in close tolerance work.

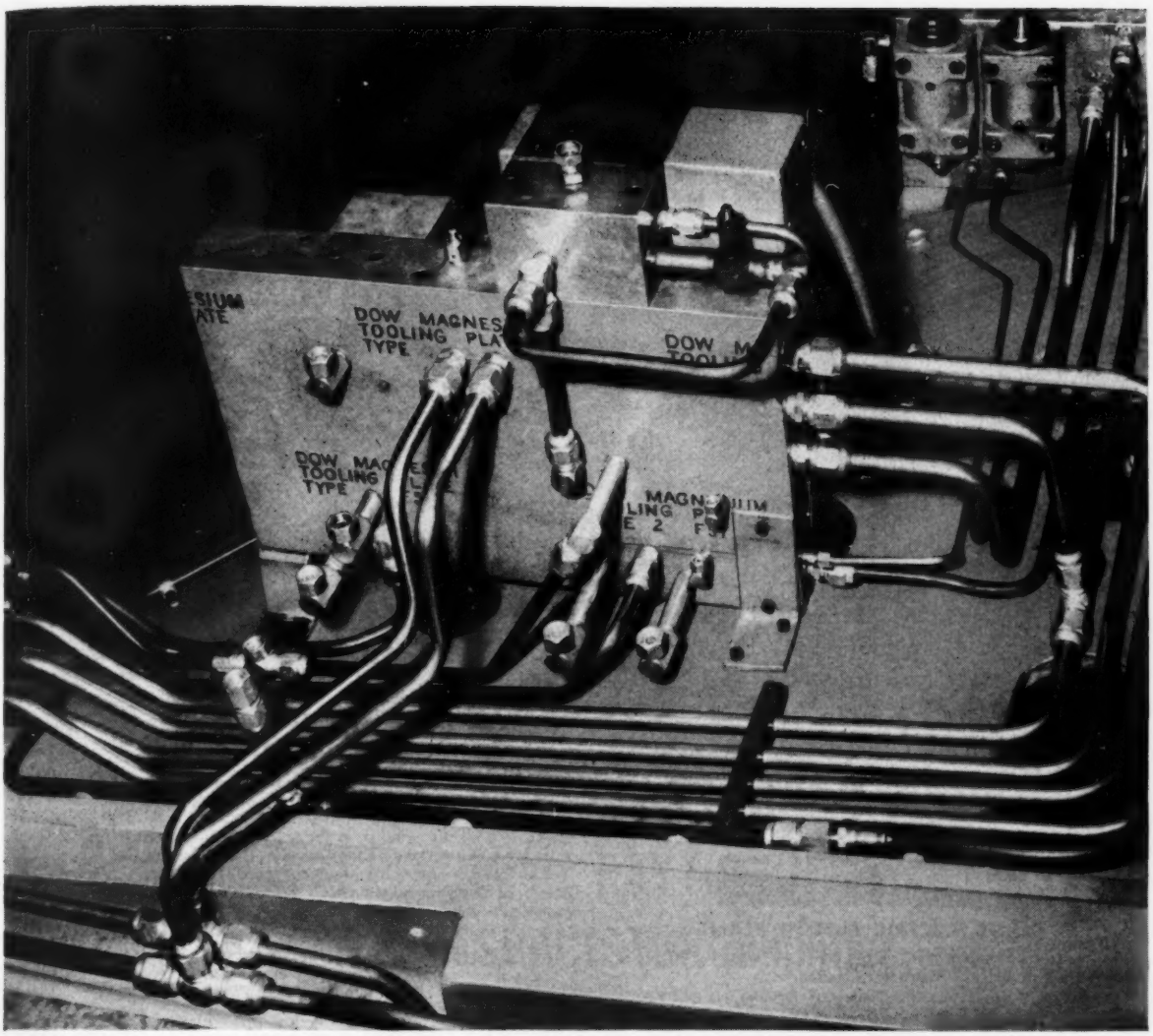


Standard sizes and lengths in stock for immediate delivery. Contact the office nearest you—Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis.—or our home office.

Write for your copy of our new 98 page catalog describing Standard Collet Chucks, Floating Collet Chucks, Boring Chucks, "Kwik-Switch" Tool Holder, Mikro-Lok Boring Bars, Standard Drill Bushings, Universal Index Plungers and other Universal products.

UNIVERSAL ENGINEERING COMPANY | **FRANKENMUTH 8, MICHIGAN**

CIRCLE INFORM-A-GRAM KEY NO. 8



EXCELLENT MACHINABILITY *of Dow magnesium tooling plate permits economies in drilling the necessary holes (approximately 100) in this 20" x 12" block.*

"ROCKFORD" SAVES 20% ON MATERIAL COSTS WITH DOW MAGNESIUM TOOLING PLATE

The many advantages of Dow magnesium tooling plate are put to use in building control panels for hydraulic planers. Rockford Machine Tool Company of Rockford, Illinois, realized a 20% savings on material costs alone by using magnesium rather than other lightweight tooling metals!

But the savings don't stop with the original purchase cost when you use Dow magnesium tooling plate. You actually save *twice:* once when you buy it and again when you use it. That's because magnesium is the easiest of all metals to machine—takes less time and less wear on tools to do the job. Magnesium tooling plate requires less machining because new closer tolerances assure better flatness and dimensional accuracy.

Next time you need a tooling metal try magnesium. You, too, will find it saves time, effort and money. Get in touch with one of the Dow magnesium suppliers listed below, or write us for more information. THE DOW CHEMICAL COMPANY, Midland, Michigan, Department MA 1431B.

AVAILABLE FROM STOCK AT

COPPER AND BRASS SALES, Detroit, Michigan
FULLERTON STEEL AND WIRE CO., Chicago, Illinois
HUBBELL METALS INC., St. Louis, Missouri
A. R. PURDY CO., INC., Lyndhurst, New Jersey
RELIANCE MAGNESIUM COMPANY, Los Angeles, California
VINSON STEEL AND ALUMINUM COMPANY, Dallas, Texas.

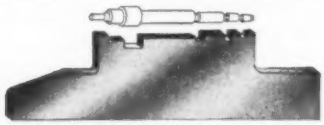
YOU CAN DEPEND ON DOW

CIRCLE INFORM-A-GRAM KEY NO. 9

Talide® Blades . . .

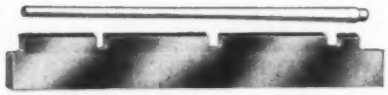
THE No. 1 CHOICE OF CENTERLESS GRINDER OPERATORS!

Above view shows Landis Centerless Grinder in operation. Talide-tipped work rest blades have been supplied as initial equipment on many Landis Centerless Grinders.



LARGE ELECTRIC MOTOR PLANT

Part . . . . . . Stainless Steel Rotor Shaft for Electric Motor.
Operation . . Grind 7 diameters simultaneously.
Machine . . . No. 12 Landis Centerless Grinder.
Blade . . . . . Special multiple step Talide-tipped work support blade No. C-4884.
Results . . . . Talide-tipped blade in continuous production for 91 days (2 turns per day) compared to best previous production run of 3 days with hard alloy steel blade.



LEADING ARMS PRODUCER reports outstanding service life with Talide centerless blades over past 10 years—outperforming and outlasting all other work support blades.

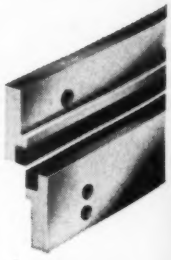
Part . . . . . . 12 gauge shotgun barrel.
Operation . . Grind entire gun barrel simultaneously to series of compound angles.
Machine . . . No. 5 Cincinnati Centerless Grinder.
Blade . . . . . Special Talide-tipped work support blade 34⅜" long, having 9 steps and 10 compound angles ground to .0001" tolerance.
Results . . . . Talide-tipped blades last 150 days per grind—hardened steel blades 3 days. Several Talide blades have been in continuous production for over 5 years—being retipped with a new Talide metal wear strip every 12 to 18 months.

Over 50 sizes and styles of standard blades carried in stock—with special blades made promptly to order. Write for 76-page catalog 56-G or ask for sales engineer to call.

TALIDE ROTARY KNIVES GIVE PHENOMENAL RUN OF 90-1 . . .

A leading strip steel producer of razor blade, high-carbon, spring and stainless steel reports over 1200 coils were gang slitted with Talide knives, compared to 15 coils with steel knives. More tonnage was produced in one regrind of the Talide knives than over the entire life of a set of steel knives. Burr-free, clean-cut edges produced with scrap rate practically eliminated.

$18,000 SAVED USING TALIDE SHEAR BLADES



A large electric motor manufacturer, shearing .014" silicon steel for transformers, advises first-year savings of $18,000 in blade costs after completely equipping their press line with Talide-tipped blades in lengths ranging from 15" to 87". Talide shear blades are averaging 1,000,000 cuts per grind compared to 10,000 cuts obtained with steel blades.

METAL CARBIDES CORPORATION
Youngstown 12, Ohio

EXCLUSIVE RETIPPING SERVICE

Because of its exclusive hot press method, Metal Carbides is able to rework worn, chipped out or broken areas of carbide-tipped blades back to original size and dimension with all breaks and defects eliminated.

METAL CARBIDES CORPORATION
TALIDE®
YOUNGSTOWN 12, OHIO

HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • ALUMINUM OXIDE • HI-TEMP. ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

CIRCLE INFORM-A-GRAM KEY NO. 10

"Commendable Comments"

"The X-15 is an 'all hard metal' aircraft. 'Hard Metal' in the language of the shop means the nickel and steel alloys just being made available to missile and aircraft builders, and different from 'soft metals' like aluminum because of their high strength and high heat resistance. Still newer metals are also being used, and these also are taxing the knowledge of men in manufacturing departments and laboratories who made new shapes of hard-to-form titanium and stainless steel. . . . The importance of the X-15 is not only in its role as the first manned space craft. Manufacturing techniques now being worked out on the new metals caused one shop superintendent to say, 'this airplane pretty well sets the pattern for future designs,' in manufacturing departments."

—from the SKYLINE, published by North American Aviation, Inc., Spring 1958 issue.

"The basic requirement for a truly integrated cost reduction program is a system of meaningful communication within a company to integrate management's goals with each employee's daily behavior."

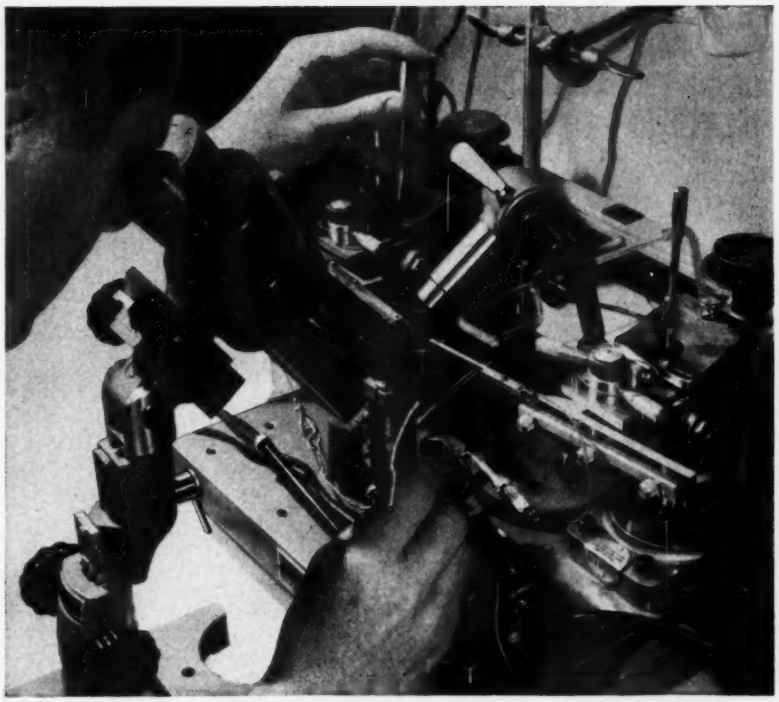
—Carl W. Nedderman, vice president of Edward Valves, Inc., subsidiary of Rockwell Mfg. Co., speaking at AMA's Manufacturing Orientation Seminar on Organization and Administration of Industrial Engineering, in Chicago.

"It is fundamental that in industry any company that expects to grow, to be of greater service to its customers, and to be able to sell its products in a highly competitive market, must have the lowest possible labor cost, which means it must operate with the least man hours per unit of product and have the most modern machines for manufacturing its products. This means that frequently existing machines which are still in good working condition must be discarded in the face of newer-type labor-saving and cost-saving tools."

—Roy C. Ingersoll, chairman of the board, Borg-Warner Corporation, addressing the recent S.A.E. National Production Activity Meeting in Chicago.

"A major effort must be made to bridge the gap between high school and college, to eliminate the tragic loss of potential scientific and engineering talent which is not developed by formal education at the higher level."

—Dr. John T. Rettaliata, president Illinois Institute of Technology, addressing Mid-West Conference on Quality Control.



3-D MICRO-VISION helps RAYTHEON develop new SPACISTOR amplifier

Spacistor shown next to ordinary pinhead.

The Spacistor, Raytheon's new semiconductor amplifier, opens new horizons in missile and communications equipment design. Still in development, the Spacistor promises to combine many advantages of transistors and vacuum tubes.

Viewed through a Bausch & Lomb Stereomicroscope, contact points that are normally barely visible can be positioned with hairline accuracy. 3-D magnification shows all parts vividly, right side up. Long working distance permits free movement of hands and tools between eyepiece and stage. Dustproof, shockproof optical system, with sharp, flat images free from distortion, assures fatigue-free viewing throughout prolonged examination.

SEE FOR YOURSELF! MAIL COUPON FOR FREE 15-DAY TRIAL

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BAUSCH & LOMB OPTICAL CO.
77330 ST. PAUL ST., ROCHESTER 2, N. Y.

☐ I'd like to borrow a B&L Stereomicroscope for a 15-day trial without cost or obligation.

☐ Send me B&L 3-D Micro-Vision Book (Cat. D-15), containing valuable data, showing actual stereo views.

NAME .....
TITLE .....
COMPANY .....
ADDRESS .....
CITY ..... ZONE ..... STATE .....

CIRCLE INFORM-A-GRAM KEY NO. 11

Why the Die Designer Prefers PRODUCTO Die Sets

He can specify Producto with complete confidence

The die designer likes to specify Producto die sets on his blueprints because they are a nationally-accepted "brand." They're easy to get anywhere.. and delivery is prompt.

He favors Producto because he knows he never has to compromise his die design. Even if the die layout is a little unusual, he will be able to select a die set to accommodate it from Producto's wide range of thicknesses and styles.

He also knows Producto has the equipment that can cut his tooling costs by letting him adapt his sets to a more economical *basic* design. Only Producto offers him complete foundry, pattern-making, welding and machining services for his special requirements.

The die designer recognizes Producto's Qwik-Fit Guide Pins as an important new feature that die makers want. He specifies them because they save up to 75% of the time normally required for die set assembly and disassembly.

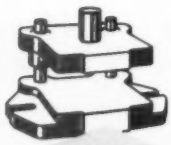
The die designer likes to use Producto's new catalog, the industry's most practical tool. His die layout is simplified when he uses Producto die set templates. And Producto provides him with cost-saving ideas in the DIE SET DIGEST.

Most important, he can depend on *consistent* Producto die set accuracy to transfer from the drawing board to the press the precision and ingenuity of his die design.

Yes, the designer has found that Producto die sets justify his confidence in specifying Producto. You will, too.

TWO FREE AIDS to more economical, efficient use of die sets are available from Producto. All-new CATALOG NO. 11 makes ordering and selection job easy. DIE SET DIGEST gives valuable tips for designers, builders and users of dies. Write for them today.

THE PRODUCTO MACHINE COMPANY
970 Housatonic Ave., Bridgeport 1, Connecticut

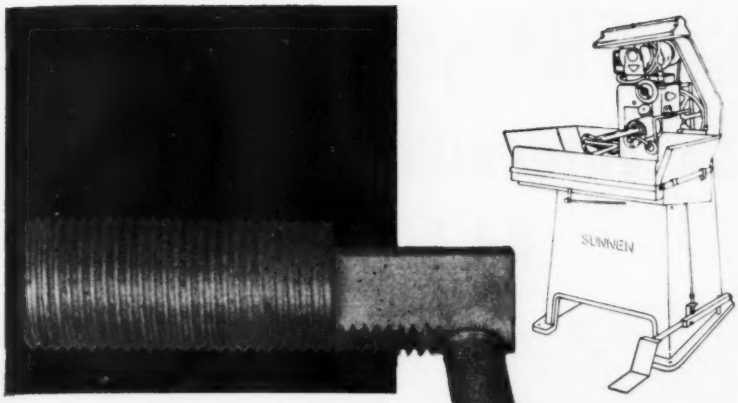


Wherever die sets are used

PRODUCTO

PRODUCE MORE WITH PRODUCTO PRECISION DIE SETS

CIRCLE INFORM-A-GRAM KEY NO. 12



PROBLEM:

PRODUCE A LEAK-PROOF FAUCET BORE ...WITHOUT FIXTURING

This awkward assembly cannot be fixtured and re-centered for boring or grinding after the slotted bushing is pressed into the blind-hole part.

Bushing Bore Specifications:
I.D.: .6151"—.6153"
Length: ⅞"
Finish: 16 micro-inches
Material: Stainless steel

Faucet controls flow of hot, cold or tempered water with one handle. By MOEN FAUCET Division of Standard Screw Co., Elyria, Ohio.

For the bushing bore must be accurately machined to correct any press-fit distortion and produce a pressure-tight valve.

The only practical answer: Sunnen Honing.

No fixtures are required because the complete assembly is self-locating on the honing tool. Sunnen Honing guarantees the required .0002" accuracy, 16 micro-inch finish and assures geometric roundness and straightness of the bore.

Results: Production bottlenecks gone ... a consistent quality product.

Average Sunnen Honing Machine installation with tooling runs about $1,000. Why not ask for a free demonstration in your shop?

Dia. range of standard honing tools: ⅛" to 2½"

SEND FOR FIVE INFORMATIVE HONING BOOKLETS

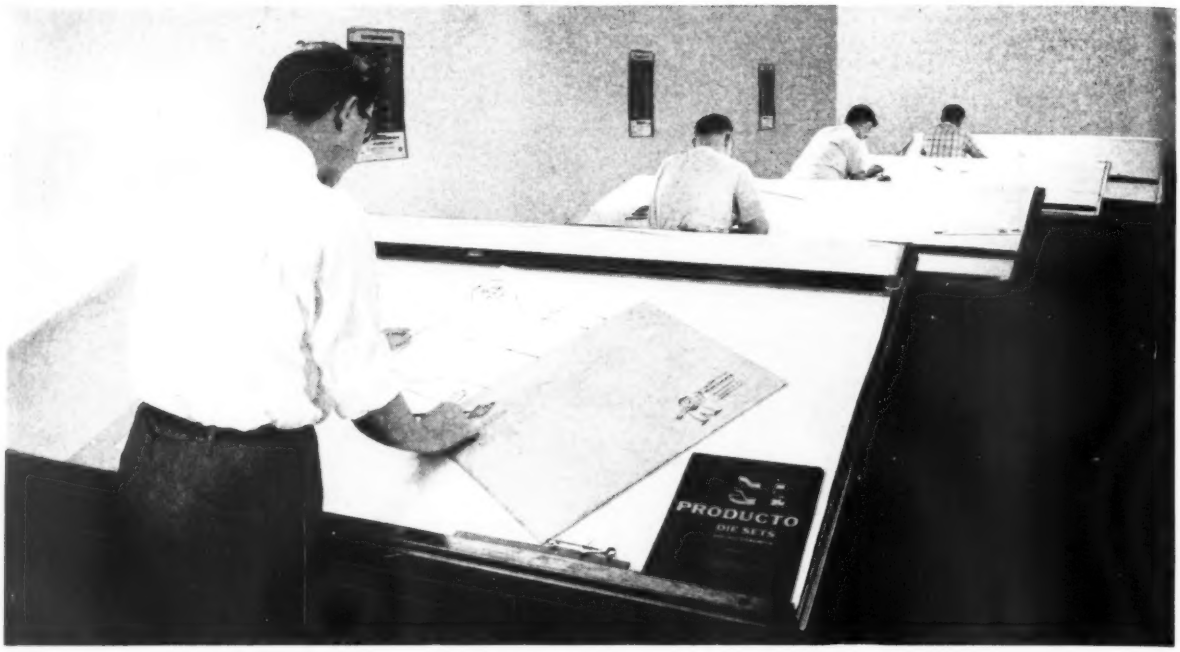
SUNNEN® PRODUCTS COMPANY

HONING

Canadian Factory, Chatham, Ontario

CIRCLE INFORM-A-GRAM KEY NO. 13

Why the Die Designer Prefers PRODUCTO Die Sets



He can specify Producto with complete confidence

The die designer likes to specify Producto die sets on his blueprints because they are a nationally-accepted "brand" They're easy to get anywhere.. and delivery is prompt.

He favors Producto because he knows he never has to compromise his die design. Even if the die layout is a little unusual, he will be able to select a die set to accommodate it from Producto's wide range of thicknesses and styles.

He also knows Producto has the equipment that can cut his tooling costs by letting him adapt his sets to a more economical *basic* design. Only Producto offers him complete foundry, pattern-making, welding and machining services for his special requirements

The die designer recognizes Producto's Qwik-Fit Guide Pins as an important new feature that die makers want. He specifies them because they save up to 75% of the time normally required for die set assembly and disassembly.

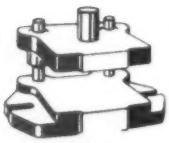
The die designer likes to use Producto's new catalog, the industry's most practical tool. His die layout is simplified when he uses Producto die set templates. And Producto provides him with cost-saving ideas in the DIE SET DIGEST.

Most important, he can depend on *consistent* Producto die set accuracy to transfer from the drawing board to the press the precision and ingenuity of his die design.

Yes, the designer has found that Producto die sets justify his confidence in specifying Producto. You will, too.

TWO FREE AIDS to more economical, efficient use of die sets are available from Producto. All-new CATALOG NO. 11 makes ordering and selection job easy. DIE SET DIGEST gives valuable tips for designers, builders and users of dies. Write for them today.

THE PRODUCTO MACHINE COMPANY
970 Housatonic Ave., Bridgeport 1, Connecticut



PRODUCTO

Wherever die sets are used

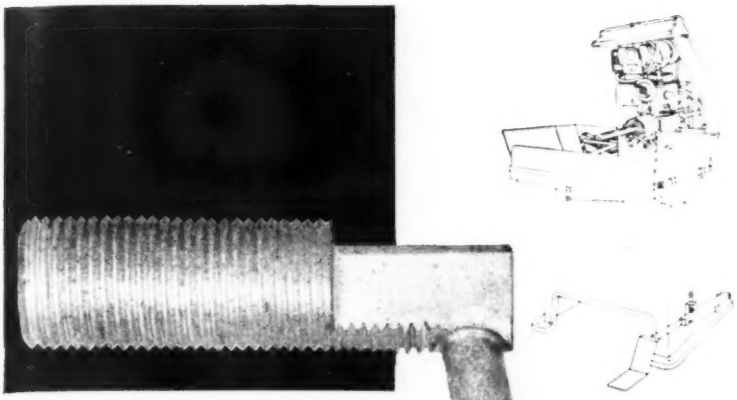
PRODUCTO

PRODUCE MORE WITH PRODUCTO PRECISION DIE SETS

CIRCLE INFORM-A-GRAM KEY NO. 12

PROBLEM:

PRODUCE A LEAK-PROOF FAUCET BORE ...WITHOUT FIXTURING



This awkward assembly cannot be fixtured and re-centered for boring or grinding after the slotted bushing is pressed into the blind-hole part.

Bushing Bore Specifications
I.D.: .6151"—.6153"
Length: ⅞"
Finish: 16 micro-inches
Material: Stainless steel

Yet the bushing bore must be accurately machined to correct any press-fit distortion and produce a pressure-tight valve.

The only practical answer: Sunnen Honing.

No fixtures are required because the complete assembly is self-locating on the honing tool. Sunnen Honing guarantees the required .0002" accuracy, 16 micro-inch finish, and assures geometric roundness and straightness of the bore.

Results: Production bottlenecks gone . . . a consistent quality product.

Average Sunnen Honing Machine installation with tooling runs about $1,000. Why not ask for a free demonstration in your shop?

Faucet controls flow of hot, cold or tempered water with one handle. By MOEN FAUCET Division of Standard Screw Co., Elyria, Ohio.

Dia. range of standard honing tools: ⅛" to 2⅝"

SEND FOR FIVE INFORMATIVE HONING BOOKLETS
CHECK READER SERVICE CARD

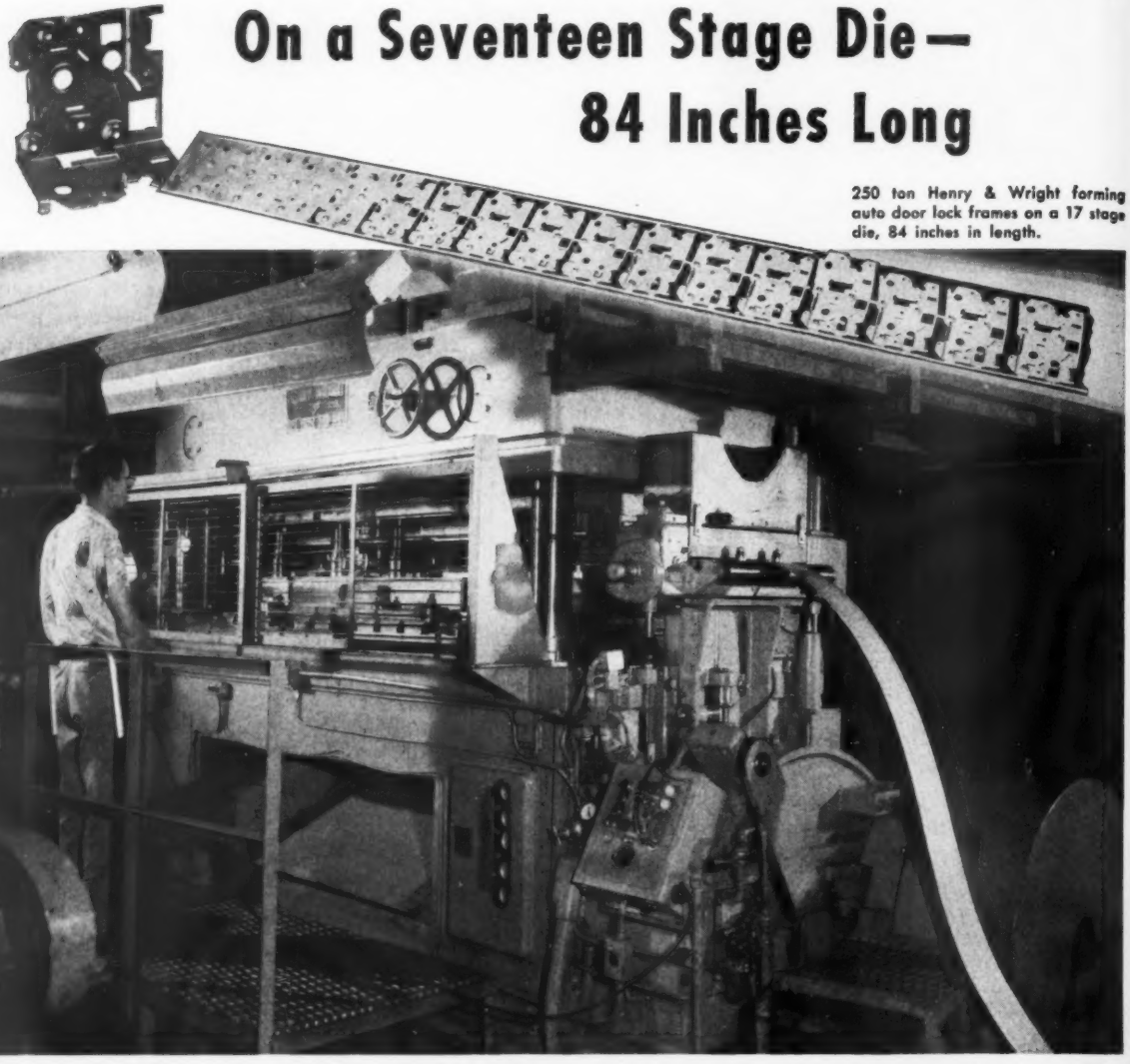
SUNNEN® PRODUCTS COMPANY
HONING

7923-N Manchester Ave. • St. Louis 17, Mo.
Canadian Factory: Chatham, Ontario 7928-R

CIRCLE INFORM-A-GRAM KEY NO. 13

80 DOOR LOCK FRAMES per MINUTE

On a Seventeen Stage Die— 84 Inches Long



250 ton Henry & Wright forming auto door lock frames on a 17 stage die, 84 inches in length.

On a Dependable HENRY & WRIGHT Double-Crank Dieing Machine

Long dies and severe off-center loading problems are handled more accurately on a new double-crank H & W dieing machine. It's a matter of the design principle; double-crank, two-point suspension of the H & W machine means better distribution of die loading, and a pulling rather than a pushing stroke on the die. Dies last longer, machine has a lower center of gravity, is stronger and more rigid. Now, you can form larger parts on lower capacity machines than ever before, or produce stampings requiring higher pressures with greater precision and less die wear. Models from 25 to 500 tons capacity meet your every need. Single-crank models also available in sizes to 400 tons. For progressive dieing problems, write or call your H-P-M representative, today.

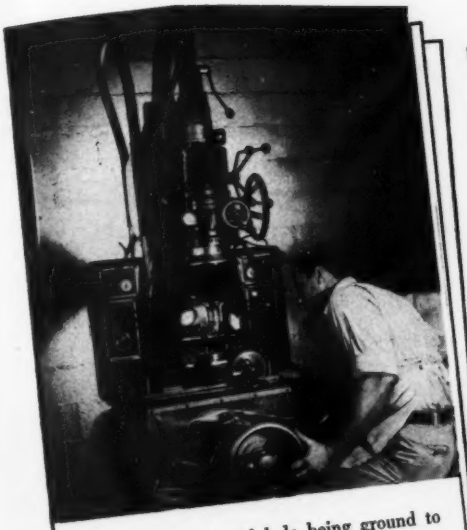
H823

HENRY & WRIGHT
Built by H-P-M

THE HYDRAULIC PRESS MFG. COMPANY
A DIVISION OF KOEHRING COMPANY • MOUNT GILEAD, OHIO, U. S. A.

CIRCLE INFORM-A-GRAM KEY NO. 14

NEW YORK



"An irregular-shaped hole being ground to within .0002" on the No. 2 Moore Jig Grinder. The machine can do contour grinding of almost any size and shape."—*from facilities booklet of August W. Holmberg & Co., Inc., Flushing, N. Y.*

MISSOURI

"Two No. 2 Moore Jig Borers...permit Ehrhardt to locate and bore holes accurately and to inspect the finished work."—*from facilities booklet of Ehrhardt Tool and Machine Co., St. Louis, Missouri.*

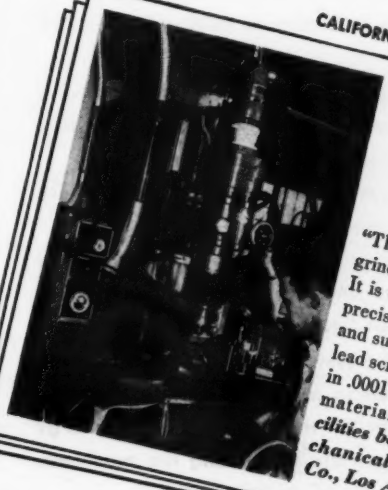
"FACILITIES, FACILITIES, FACILITIES..."

How Leading Tool and Die Shops Across the Nation Feature MOORE Jig Borers and Jig Grinders

Today, top contract tool and die shops often rely on illustrated booklets to sell prospects on their facilities. And they often rely on pictures of their Moore Jig Borers and Jig Grinders to indicate the degree of precision work they can do. It's particularly significant that leading contract shops choose Moore machines for "double duty"—in the toolroom and on the printed page—for these owner-managed firms are understandably deliberate and judicious in selecting machine tools. Write today for detailed bulletins on Moore's top-billed toolroom teammates.

MOORE SPECIAL TOOL COMPANY, INC.
726 Union Avenue, Bridgeport 7, Connecticut

CALIFORNIA



"This precision jig grinder is a Moore No. 2. It is used for producing precision holes, contours and surfaces to accurate lead screw settings within .0001" in heat-treated materials."—*from facilities booklet of Mechanical Specialties Co., Los Angeles, Cal.*

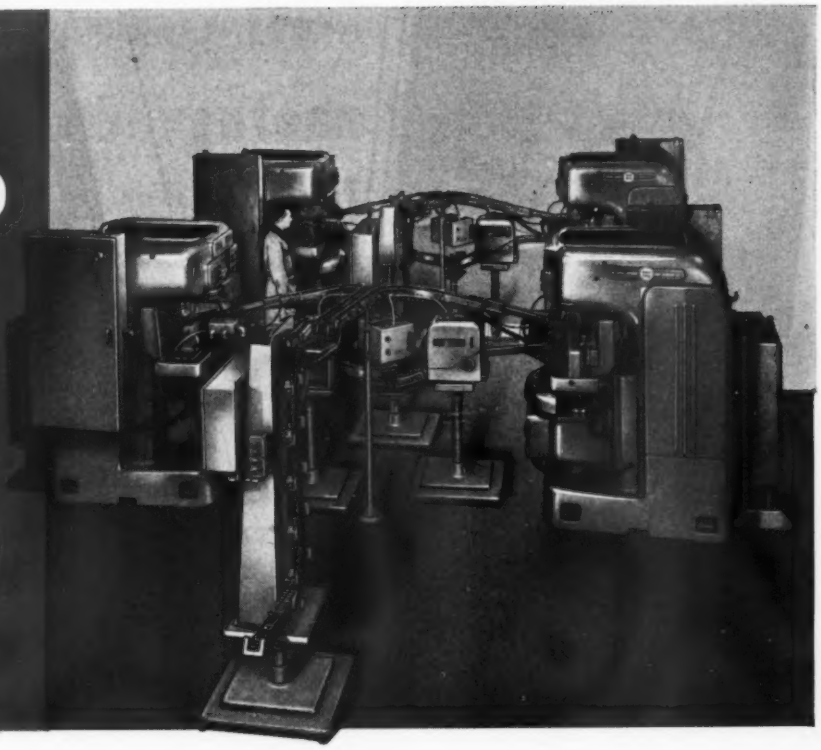
HOLES, CONTOURS AND SURFACES
Moore's *all-new* book tells you how to produce tools, dies and precision parts *the modern way*. 424 pages, 495 illustrations. $5 in U.S.A., $6 elsewhere.

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

CIRCLE INFORM-A-GRAM KEY NO. 15

FULLY AUTOMATED GEAR SHAVING *CAN ALSO BE* PERFECTLY FLEXIBLE



This fully automated installation shaves the split long pinion used in automatic transmissions. This pinion consists of two gear sections each of which is individually crown shaved. Output at full efficiency is 400 pinions (800 gear sections per hour).

The first pair of standard Red Ring Shaving machines processes one of the pinion sections. The second pair processes the other.

Automatic sizing gages perform a 100% check and reject any out-of-tolerance units.

Any individual shaving machine may be stopped at any time for cutter change or adjustment without interferring with the operation of the rest of the system. This is provided for by automatic switching in the feeder lines.

The flexibility of the supply and discharge lines greatly facilitate positioning the machines.

Write for further details.

SPUR AND HELICAL GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING
AND ELLIPTOID TOOTH FORM

NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN • DETROIT 13, MICHIGAN

7788

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

CIRCLE INFORM-A-GRAM KEY NO. 16

Let's CUT COSTS

on these Secondary Operations

- DRILLING
- REAMING
- TAPPING
- TURNING
- MARKING
- PUNCHING
- GRINDING
- ROUTING
- SAWING
- THREADING

High cost second operations can kill first operation profits. If you perform any of the above secondary operations, better take a critical look at how you do it. There may be cost saving opportunities you've overlooked.

If any one of them involves hand feeding of parts or tools—hand clamping—or mechanical means of performing push, pull or lift motions—The Bellows Co. can save you money.

The Bellows Air Motor and the numerous Bellows packaged pneumatic work units can, in a few minutes, transform hand operated machines and machine tools into fast automatic or semi-automatic production units. They are inexpensive to buy—your own tool room can install them quickly.

Here's how to start—

Write for these two bookets. Bulletin ML-3 and BM-25 will give you a quick picture of what others are doing—of what you can do—in cutting second operation costs. Write Dept. TP658, The Bellows Co., Akron 9, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto, Ontario.

The Bellows Co.

AKRON 9, OHIO

B94-B

CIRCLE INFORM-A-GRAM KEY NO. 17

BREAK THRU THE COST BARRIER with . . .

Harig

CARBIDE DIES!

✓ LESS DOWNTIME ✓ BETTER STAMPINGS
✓ LONGER LIFE ✓ LOWER COST PER BLANK

Harig Carbide Dies typically out-produce steel dies 10 to 1 per sharpening and per die . . . yet cost only 1.5-2 times more than a steel die. Thus, a Harig Carbide Die affords you ***true economy.*** Harig is the industry leader because it has the skilled craftsmen and most modern equipment to build a better die.

Harig

EQUIPMENT INCLUDES...

8 Jig Grinders	1 Notching Press (For Laminations)
7 Jig Borers	
6 Profile & Contour Grinders	9 Universal Grinders
52 Surface Grinders	15 Lathes
6 Tryout Presses	15 Milling Machines
6 Comparators	2 Boring Mills

Complete Inspection Dept.

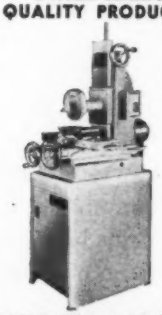
WHATEVER YOUR TOOLING REQUIREMENTS . . . HARIG IS READY TO SERVE YOU!

- ☐ ENGINEERING
- ☐ DESIGNING
- ☐ CARBIDE DIES
- ☐ LAMINATION DIES
- ☐ PROGRESSIVE DIES
- ☐ MOLDING DIES
- ☐ JIGS, FIXTURE, & GAGES
- ☐ SPECIAL MACHINING

Remember

Harig serves all America . . . so, regardless of location, be sure to contact us for a quotation on your next tooling program.

OTHER HARIG QUALITY PRODUCTS



HARIG TML 6x12 SURFACE GRINDER — The Tool & Die Maker's Precision Grinder.

GRIND-ALL FIXTURE — The latest advancement in Perforator Grinding.

WRITE FOR FREE CATALOG

Harig Manufacturing Corp

5761 W. HOWARD ST. • CHICAGO 31, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 18

Coming Events

June 1-4. American Gear Manufacturers' Association. Annual Meeting. Homestead, Hot Springs, Va.

•

June 2-4. National Fluid Power Association. Annual Meeting. Bedford Springs Hotel, Bedford, Penn.

•

June 4-5. Pressed Metal Institute. Personnel Management Meeting. Hotel Carter, Cleveland.

•

June 8-13. Society of Automotive Engineers. Summer Meeting. Chalfonte-Haddon Hall, Atlantic City, N. J.

•

June 9-12. American Society of Mechanical Engineers. Materials Handling Conference and Exhibit. Public Auditorium, Cleveland.

•

June 9-13. University of Pennsylvania. Fourth Annual Automation Seminar. Pennsylvania State University, University Park, Penn.

•

June 9-13. Fourth International Automation Exposition and Congress. New York Coliseum, New York City.

•

June 9-21. International Organization for Standardization. Triennial Meeting. Harrogate, England.

•

June 11-14. American Society of Mechanical Engineers. Third U. S. Congress of Theoretical and Applied Mechanics. Brown University, Providence, R. I.

•

June 15-19. American Society of Mechanical Engineers. Semi-Annual Meeting. Hotel Statler, Detroit.

•

June 21-24. Alloy Casting Institute. Annual Meeting. Homestead, Hot Springs, Va.

•

June 23-27. American Standards Association. Seminar on Industrial Standardization. New York City.

•

June 23-27. American Institute of Electrical Engineers. Summer General Meeting. Hotel Statler, Buffalo.

•

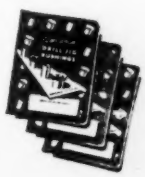
June 26-27. Society of Plastics Industry, Inc. SPI Midwest Section Conference. French Lick-Sheraton Hotel, French Lick, Ind.

The Candy with the Hole in the Middle

*The Drill Bushing with the Hole in the Middle **

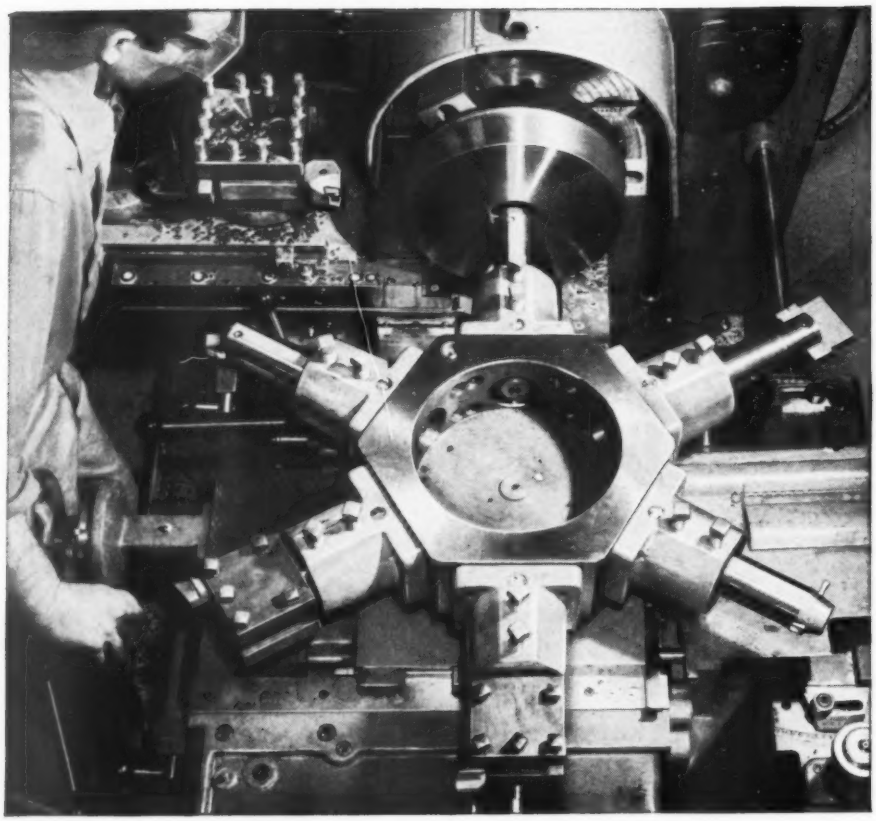
* Our 100% concentricity inspection means every hole is EXACTLY centered. Another "Life Saver" for you!

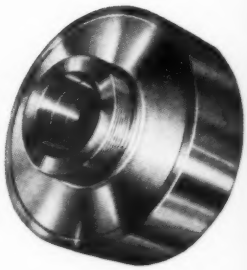
American
DRILL BUSHING CO.
5107 Pacific Boulevard
Los Angeles 58, Calif.



SEND NOW FOR FREE COPIES OF OUR NEW CATALOGS

CIRCLE INFORM-A-GRAM KEY NO. 19





Expert setup gets more work per chucking

How manufacturer uses C/F turret lathe to produce variety of chuck bodies with only one tool change

To do the job, the manufacturer selected a Gisholt 1L Saddle Type Turret Lathe with a cross-feeding hexagon turret. A 15″ 3-jaw air chuck holds down chucking time. One set of adjustable serrated jaw bases handles the different workpiece sizes for first machining operations. A quick-indexing square turret on the cross slide carries turning, facing and chamfering tools, which work simultaneously with tools on the hexagon turret.

Three stub boring bars on the hex turret bore, counterbore, recess and back face. Because size is set with the cross-feeding turret, these same boring bars are used on different part sizes. Also on the hexagon turret are 2 box-type tool posts for facing, boring or recessing—used for different size workpieces because of the cross-feeding feature. A threading attachment lets the manufacturer thread the hubs, and a taper attachment handles up to 8 inches taper per foot when required.

The sixth tool on the hex turret, a spade cutter, is used for final sizing and is the only special tool changed for each job.

Simple, low-cost tooling combined with the cross-feeding hexagon turret offers maximum efficiency in handling various sizes of similar parts. The rugged Gisholt MASTERLINE Saddle Type Turret Lathes have the speeds, feeds and power to complete the work in the least amount of time. Call your Gisholt Representative today, or write Gisholt for literature.

MASTERLINE GISHOLT SINCE 1887 GISHOLT

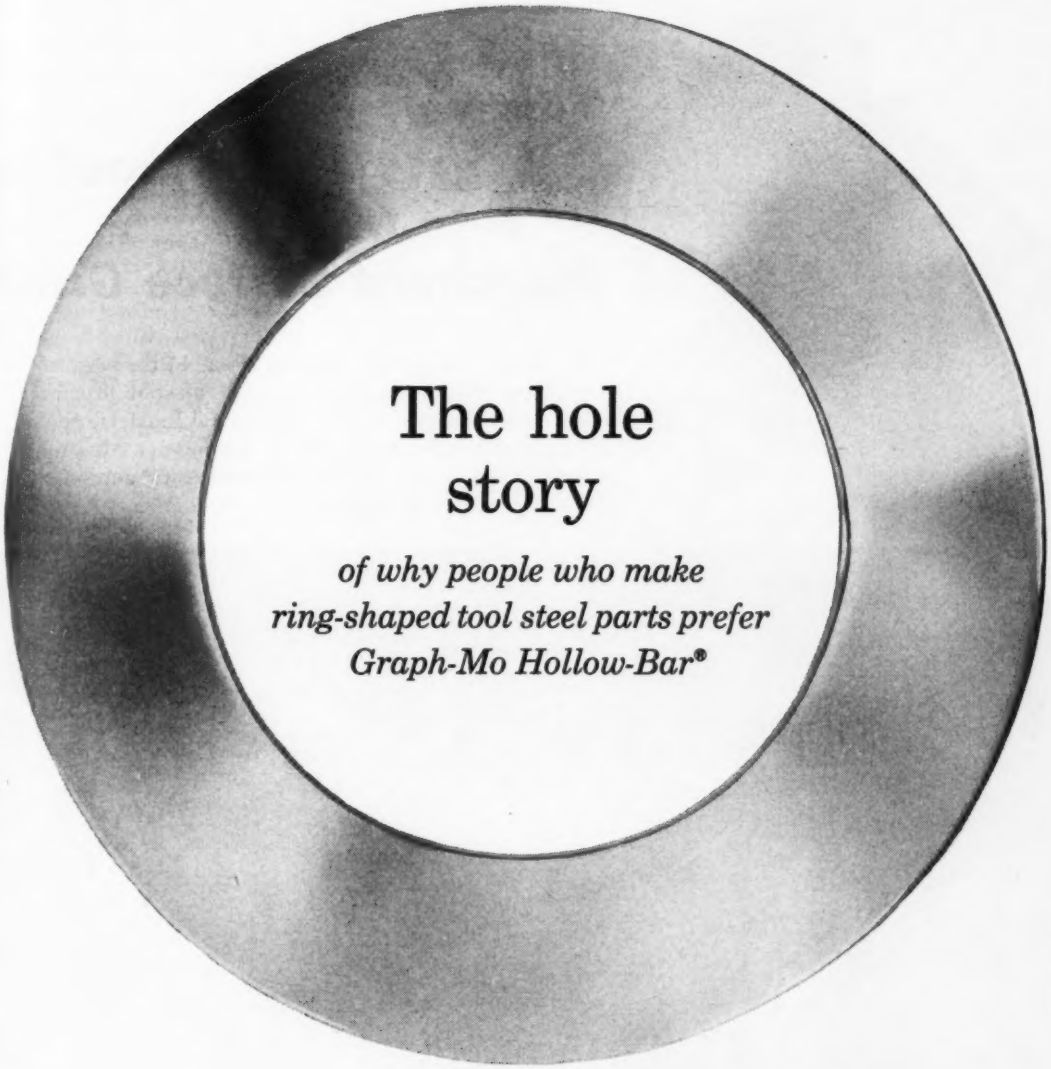
GISHOLT MACHINE COMPANY

Madison 10, Wisconsin, U.S.A.

WRITE TODAY for complete set of Gisholt MASTERLINE Saddle Type Turret Lathe Bulletins.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • PACKAGING MACHINES • MOLDED FIBERGLAS PLASTICS

CIRCLE INFORM-A-GRAM KEY NO. 20



The hole story

of why people who make ring-shaped tool steel parts prefer Graph-Mo Hollow-Bar®

Eliminate drilling and you cut the cost of making ring-shaped tool steel parts. That's a big reason why more and more tool makers are switching to Graph-Mo Hollow-Bar®. The hole is already there. By starting with finish boring you save manufacturing steps and machining time.

But that's just half the story because Graph-Mo also machines faster, wears longer and gives more stability than ordinary tool steels.

Graph-Mo machines faster because of the free graphite in its structure. There's far less tendency to pick up, scuff and gall. And users report Graph-Mo averages three times longer wear than other tool steels. The reason is the combination of free graphite and diamond-hard carbides in the Graph-Mo structure. As for stability, a master plug gauge machined from Graph-Mo was examined after 12 years of use. Dimensional change was less than 10 millionths of an inch!

Do what other tool makers are doing. Specify Graph-Mo Hollow-Bar for *all* your ring-shaped parts. You'll save time, money, and have a better finished product. Choose from 3 to 16-inch O.D., many wall thicknesses. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN *Fine Alloy* **STEEL**

TRADE-MARK REG. U.S. PAT. OFF.

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS STEEL TUBING

CIRCLE INFORM-A-GRAM KEY NO. 21

This valve gets a leak-proof seal from a Blanchard Surface Grinder

"The Blanchard Surface Grinder is one of the most important improvements in our modernization program." This report comes from the Commercial Refrigeration Division of Bendix-Westinghouse Automotive Air Brake Company—makers of power and condensing units for refrigeration equipment.

The Blanchard No. 18 Surface Grinder puts a surface of 5 micro inches or better on Bendix-Westinghouse valves at the rate of 75 pieces an hour.

A Blanchard Model 18 Surface Grinder is used to finish grind valve plates used in Bendix-Westinghouse electric refrigeration compressors. They say: "This operation is very important, because—with a surface finish of five micro inches or better—we get a perfect seal on our gaskets and valves, eliminating the possibility of leakage."

Is there room for improvement in *your* surface grinding? For best results...

Write today for your free copy of "Work done on the Blanchard," fifth edition, and "The Art of Blanchard Surface Grinding," fourth edition.

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.

CIRCLE INFORM-A-GRAM KEY NO. 22

PANELISTS EVALUATE RECENT DEVELOPMENTS IN CUTTING METALS

There is no status quo in the art and science of machining metals; this summarizes the convictions of seven leading authorities who recently panelled a meeting of tooling and production men from New York State's Niagara Frontier. The occasion was an invitation meeting honoring the fourth anniversary of the young but dynamic Niagara Cutter Division of Bollier-Damerall Inc., North Tonawanda, New York.

More than 250 engineers and executives threw question after question at the panel ably moderated by Dr. W. Eugene Merchant, Director of Physical Research, Cincinnati Milling Machine Co. The observations reported here were entirely answers to questions from the audience; there were no formal presentations.

On HSS and Cast Alloys:

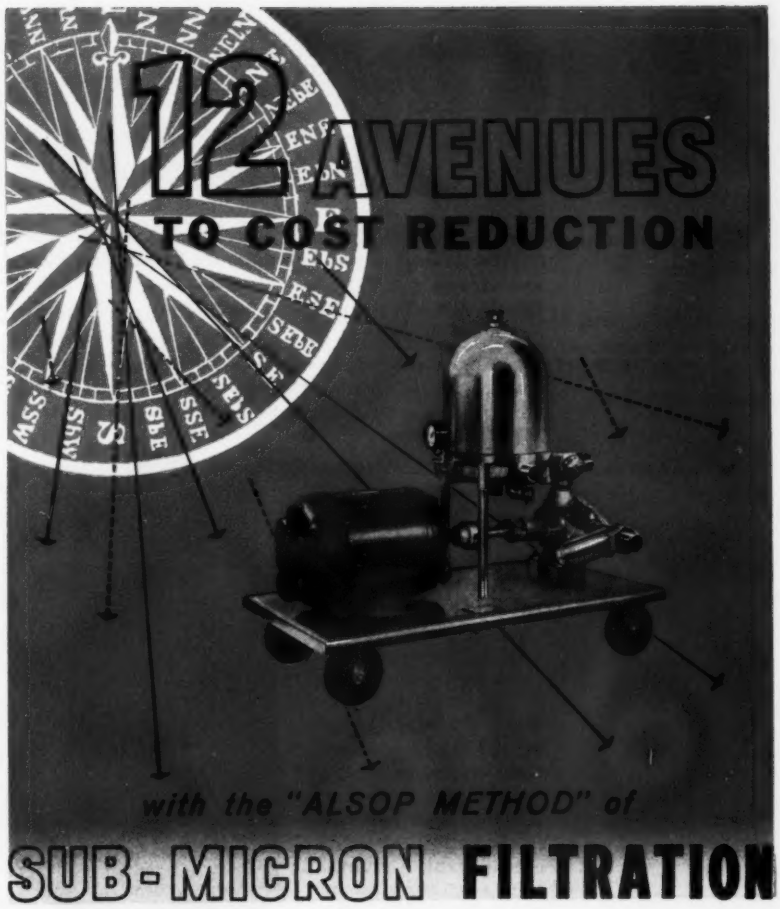
Free machining grades of tool steel have greatly benefited the metalworking industry, according to Nicholas Pavente, Research Engineer with Crucible Steel Co. He cited an average 25-35% improvement in machinability of high speed steels by the addition of sulphur without any impairment of cutting efficiency. New improved vanadium types of tool steel are being used with remarkable success on the machining of SAE 4340 of Rockwell 38-42. He further stated that these materials may be machined and heat treated to extremely close tolerances. And this is especially valuable on unground hobs.

The replacement of high speed steel by carbides on all high production jobs will probably never come about, said George Moore, General Toolroom Foreman at Chevrolet's Buffalo plant, although this objective is constantly being sought. Such operations as broaching, hobbing, gear cutting, and complex form toolwork are still virtually untouched by carbides.

George Brennan, General Manager of Vascoloy-Ramet Corp., agreed that high speed steel cutters will still be with us 10, 15 and 20 years from now. He said, "Geometry limitations and those imposed by economical machine design will keep high speed steel long in the picture, if not forever."

Cast alloys known by such trade names as Tantung and Rexalloy, said Brennan, are still considered major cutting alloys. They have a definite place in the metal cutting field, and bridge the gap between those appli-

. . . *Continued on page 24*



The following cost reductions are substantiated by "in shop" tests:*

1. Increased production
2. Improved finish and controlled accuracy of work pieces
3. Reduction of coolant waste
4. Elimination of systems cleaning
5. Abatement of dermatitis in workers
6. Improved machine cleanliness
7. Prolonged accuracy of tools
8. Longer tool or abrasive wheel life expectancy
9. Reduced wheel loading and wheel dressing
10. Maximum recovery of precious (diamond) swarf
11. Reduced swarf handling and shipping costs
12. Reduction in parts cleaning costs

The "ALSOP METHOD" of sub-micron filtration on coolants, cutting oils and hydraulics is obtained with compact—large area—volume capacity units.

May we have our representative call and discuss a trial demonstration in your plant? No obligation of course.

A request on your letterhead will open these avenues for you.

*Engineering Bulletins on Request

ALSOP ENGINEERING CORPORATION

1306 Andrews Street Middletown, Connecticut

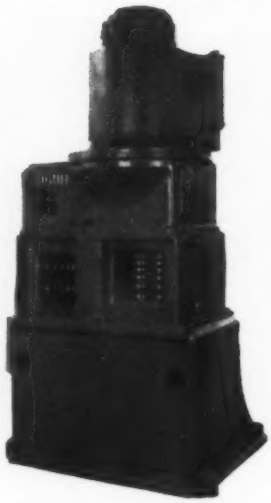
CIRCLE INFORM-A-GRAM KEY NO. 23

STEEL *from Wheelock, Lovejoy* BULLETIN

W-L CHICAGO Now in an ideal position to supply HY-TEN "M" Temper in large forged flats up to 6 x 22", rounds to 18" and squares to 17½". Also "B" No. 3-X in large forged flats to 6 x 13", rounds to 18" and squares to 16". Alloy forgings a specialty.

W-L DETROIT The new, larger warehouse and office here have greatly speeded up delivery on our orders and services in this area. Have a good stock of A-8620 on hand as well as all HY-TEN grades.

W-L CLEVELAND The rolls for this Vaughn Four-Roll Continuous Pointer are fabricated from HY-TEN "M" Temper, nickel-chromium-molybdenum oil hardening steel. This Pointer, largest of its type in the world, can point rods ranging from ½" to 1¼" dia. HY-TEN "M" was selected by the machine manufacturer because it can be quenched and tempered to high hardness levels while retaining considerably greater toughness than would be possible with most other steels.



W-L CINCINNATI Another new and larger warehouse recently opened here. Same-day service on all sizes, shapes and grades of HY-TEN, plus our usual help on metallurgical problems.

W-L HILLSIDE, N. J. This W-L warehouse has an excellent stock of HY-TEN "B" No. 3-X in rounds, flats and squares. Same-day delivery is promised. Many of the larger sizes of forged rounds are rough turned.

W-L CAMBRIDGE HY-TEN "B" No. 2 is still a great favorite in New England for parts requiring medium duty and high quality at a reasonable price. Our research and development assure better HY-TEN specials — "the standard alloy steels of tomorrow."

W-L BUFFALO New HY-TEN "B" No. 3X-40 now available here in rounds ½" to 8¼" and hexagons 1¼" to 2¾", heat treated to 300 Brinell. Machines as easily as heat-treated 4140 leaded, but less expensive. Suitable for flame or induction hardening — tough and shock resistant.

Write our Cambridge office today for your *free* Wheelock, Lovejoy Data Sheets. They'll give you complete technical information on grades, applications, physical properties, tests, heat treating, etc.

WHEELOCK, LOVEJOY & COMPANY, INC.

135 Sidney Street, Cambridge 39, Mass.

AMERICAN STEEL WAREHOUSE ASS'N

AGENTS: Southern Engineering Company, Charlotte, N. C.; Sanderson-Newbould, Ltd., Montreal & Toronto

CIRCLE INFORM-A-GRAM KEY NO. 24

. . . Panelists from page 23

cations very appropriate for high speed steel and those where carbides may be used most effectively. Cast alloys may be effectively used on many applications in this middle range of machining.

On Cemented Carbides:

Two important developments have been real shots in the arm for the carbide tool industry, claimed George Brennan. These are the throwaway design concept, and the introduction of the present *premium* grades of cemented carbide.

Brennan predicted that further advances in carbide metallurgy will reduce the number of essential grades to where possibly just *two* grades will take care of *all* machining requirements. He stated further that additional work is being done by the industry to achieve more economical ways to apply carbide, as typified by today's throwaway tooling.

In answer to a question relative to the directionality of carbide properties, Max Kuderko, Quality Control Supervisor for Vascoloy, asserted that there is no difference in the structural strength corresponding to the direction in which the carbide is pressed. He said the carbide may possibly differ dimensionally because of greater pressure in one area than another, but that the amount of shrinkage is uniform regardless of the cross-section, and the material is homogeneous and exhibits uniform physicals throughout.

Kuderko said that there are so many variables involved in the production of carbide that a minute change in the raw material, for example, might affect slightly the final hardness reading. This would not necessarily mean that other properties are so altered as to change the quality of the metal in the same relative range of application. Further, in this range of hardness values, two different persons seldom read within one-tenth of each other.

Replying to a question on the relative value of elevator vs solid base tool holders, Robert Stuart, Chief Engineer of Vascoloy-Ramet, pointed out that the elevator-type tool was developed by his company for full-length inserts, but it was later realized that lengths other than full could be used. Inserts were being used down to where only a ⅛" slug was left. It was found to be ideally adapted for throwaway use, and thinner carbide tips can be used when desirable. The elevator can be economically replaced when necessary.

. . . Continued on page 28

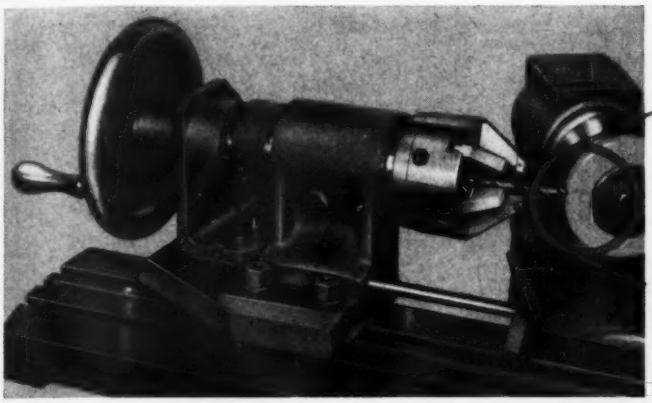
New! TRU-KUT POINT MASTER

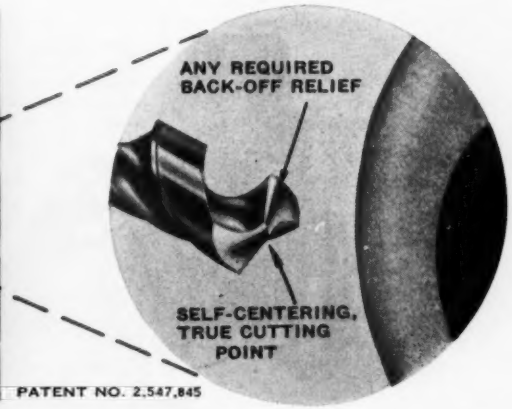
Produces and Reproduces "TRU-KUT" Points on Drills

EASIER . . .
FASTER . . .
LOWER COST . . .
CONSISTENT CUTTING POINTS

In many plants, the cost of producing drilled holes is one of the highest manufacturing expenses. Yet, over the years the inefficient chisel edge drill point with its large negative rake angle has remained virtually unchanged.

To secure more efficient cutting action at the drill point, tool room and production personnel frequently regrind chisel point drills by hand. But, hand grinding is costly, time consuming and results are seldom consistent.





PATENT NO. 2,547,845

NOW! Detroit Reamer & Tool Company offers the simple to use Tru-Kut Point Master—it is comparatively low in cost and eliminates the human variance factor. After quick and easy set-up, Tru-Kut drill points having any required cutting or relief angle can be duplicated time after time on the Point Master—and at a much faster rate of production.

The Tru-Kut Point Master can be used on most cutter grinders, Universal grinders and surface grinders. Standard grinding wheels are used. The front edge of wheel periphery is dressed to a radius that provides the self-centering "Tru-Kut" point.

Types of drills you can resharpen with the Tru-Kut Point Master for more efficient drilling are almost unlimited—crankshaft drills, sheet-metal drills, standard drills, step drills, etc. You can also grind lead angles and chamfers with radial clearance on taps; chamfers, end cuts and chip-breakers on 2-flute and 4-flute tools; chamfers and points on step-drills; thin-out webs at front; and gash cutting edges.

For additional design features, benefits, grinding, uses, etc., write to:

Tru-Kut Drill Points Assure:

- Rounder Holes
- Straighter Holes
- Truer sized Holes
- Practically burr-free Holes
- Less Bell-mouthing
- Self-centering drills
- More accurate positioning
- Longer drill life
- Cooler cutting drills
- Cutting edges from O.D. to center of drill point.
- Less grabbing when drilling thin metal
- Minimum work distortion when drilling thin metal
- Proper clearance on entire cutting edge of point
- Lower drill thrust
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CIRCLE INFORM-A-GRAM KEY NO. 25

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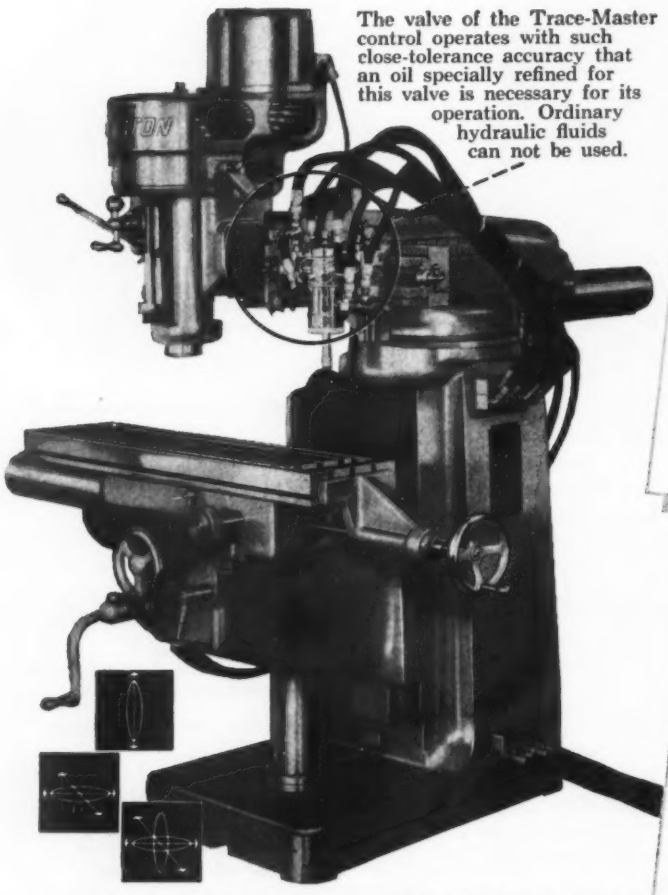

The valve of the Trace-Master control operates with such close-tolerance accuracy that an oil specially refined for this valve is necessary for its operation. Ordinary hydraulic fluids can not be used.

Nowhere Else will you find this combination

1. TWO H.P. spindle motor
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4. Rigidity . . . (2,800 lbs net weight)
5. Extra long saddle

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5. Boring

3 Models Available (1) 180° Vertical Hydraulic Feed to Knee (2) 360° Cross Hydraulic Feed to Ram and Longitudinal Hydraulic Feed to Table (3) 3D Hydraulic feed to knee, ram and table for 3-dimensional work.

Trace-Master controls can be furnished with the Model 1-22 Mastermil illustrated above or the Model 9-J Super-Speed Vertical Mill with single spindle, twin spindles and/or six inch higher column for additional vertical capacity.

Write for Bulletin 2771-1206

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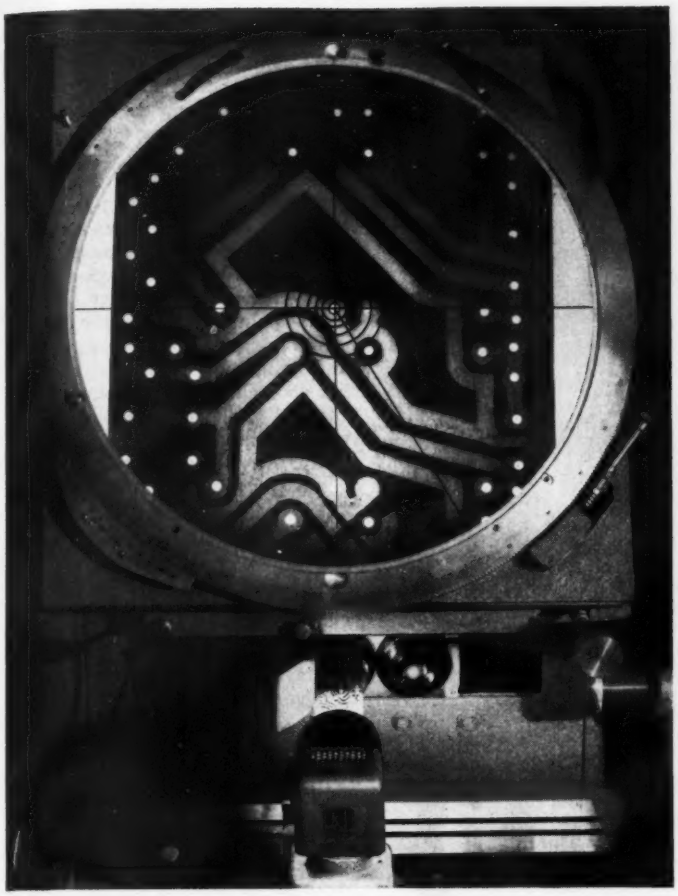

J & L Comparators are ideally suited for inspection of printed circuits — because they provide coordinate measuring facilities corresponding to the method by which circuits are dimensioned.

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A Comparator, equipped with a surface illuminator, projects a reflected image to a chart having radii and lines. By comparing the image of the drilled holes to the radii on the chart the size and location of the holes may be determined.

True precision like this never comes cheap!

Of all the possible areas in which to economize, quality inspection is the least promising. Why?

Simply because the kind of intensive research, painstaking engineering and top-quality manufacture it takes to produce precision inspection equipment like the J&L Comparator just CAN'T be offered at bargain-basement prices. On the other hand, cheap equipment doesn't belong in the same league with a J&L Comparator when it comes to accuracy, speed, versatility and all-round dependability. When it comes to true precision of inspection, a cheap comparator can prove to be *terribly* expensive.

J&L Comparators come in 11 models, both bench and pedestal type.

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Model FC-30

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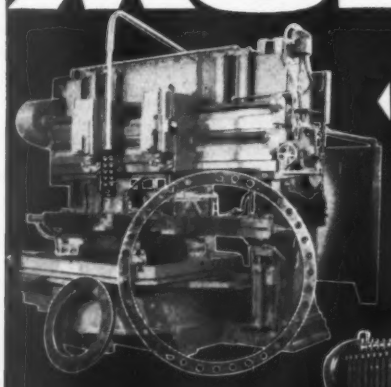
MOLINE



HD68 drills bolt circles from 12" to 100" diameter. Each of the two spindles has capacity for 2½" drill in steel. Operating cycle is fully automatic.

HD13 straight line-type drilling machine with capacity for thirty ¾" drills in steel. Used for work on heavy castings, round and rectangular steel tubes, structural shapes, plates and grader blade drilling or countersinking.

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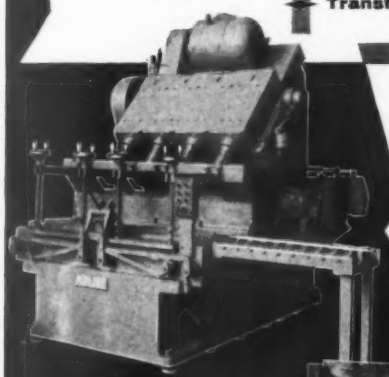

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13CB hydraulic feed cylinder boring machine. V-8 engine blocks are rough and finish bored for wet-type cylinder sleeves. Units of this kind are applicable for transfer machines.

MR152 performs drilling, reaming, spot facing and chamfering operations on tractor rear axle housings. A companion machine, MR151, does tapping in addition to the foregoing operations. Work holding fixtures are mounted on power driven trunnion.

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CIRCLE INFORM-A-GRAM KEY NO. 28

. . . Panelists from page 24

There is no question but what throwaways in face mills for machining the ends of structural shapes must be backed up in every direction, claimed Brennan. Throwaway blades in such cutters must be indexable within 0.0005", he said, and must track almost perfectly.

Although there has been some demand for chip-breakers molded into the carbide blank, Brennan emphasized the impracticality of doing so. He pointed out that it is difficult to regrind such chipbreakers without destroying their geometry, and said that good chip-breaker action can be obtained by incorporation of this detail into the holder. The carbide anvil has not proven too valuable a factor, according to Stuart, who said that incorporation of a steel anvil in the elevator-type tool provides good support. He reasoned that the use of a carbide anvil can be eliminated if the tip is of standard thickness.

The use of carbides for production drilling of steel parts, reported Stuart, is now limited. Many people, however, are becoming more accustomed to the requirements of carbide in this area of machining, and further progress in the design and application of tools for these applications will occur. He pointed out that solid carbide drills are already in rather common usage, but the breakage of a solid carbide drill is quite costly and many management people are reluctant to incur this risk.

Most stainless steels are being machined, said Vascoloy's Kuderko with a straight tungsten grade of carbide with 6% cobalt, or with one of the newer premium grades. Sub-zero (−100 to −140°F) coolant may be satisfactory, said Stuart, if their use is limited to keeping the cutting tool tip at room temperature; but, if the purpose is to lower the tip below room temperature, there would likely be excessive stress effect and immediate or eventual fracture of the tool material. (Your editor feels that the use of such coolants might adversely affect the machinability of the work material, by limiting the function of plastic flow in chip formation.)

On Ceramic Tooling:

While ceramics are being applied with unqualified success to the machining of graphite, carbon, and other non-metallics, said George Barnes, Ceramic Engineer for Norton Company, their application to the machining of metals should be approached with caution. The possible

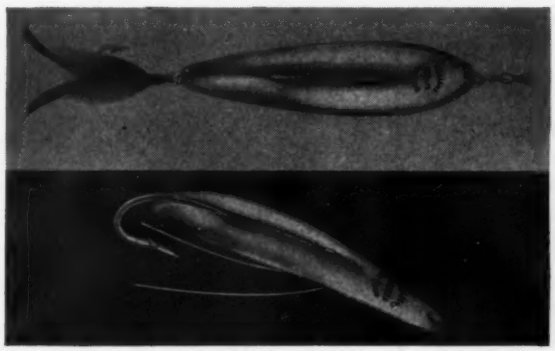
. . . *Continued on page 30*

NEW BRASS CUTS POLISHING COST

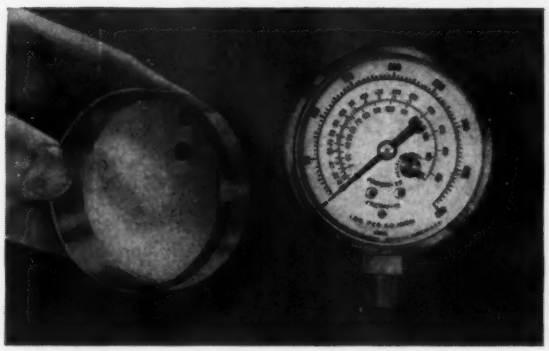
also gives you clean, easy drawing and forming, plus higher physical properties—Formbrite,® Superfine-Grain Drawing Brass by Anaconda

AIRGUIDE Instrument Co., Chicago, gets high luster finish on bezels for its famous weather instruments at 50% lower cost since it switched from ordinary drawing brass to Formbrite. Airguide does the presswork—says Formbrite "draws and forms excellently." Driscoll & Co. (above) polishes the bezels.

BAROMETER in Chippendale style, "Mayfair," is one of the broad line of brass-trimmed instruments made for home and marine use by Airguide.



FISHING LURES made by Williams Gold Refining Co., Inc.—"Wabler," top and "Weedler," below—are polished for plating by tumbling. Switching from ordinary yellow brass to Formbrite cut costs more than 40%.



MARSH Instrument Co., Skokie, Ill., dropped a finishing operation and gets a "mirror finish" with a light buff, by using Formbrite. Marsh reports that finishing cost was cut 40% and that forming is "excellent."

Wherever finishing is an important cost factor in formed or drawn products, Formbrite in sheet and strip is designed to save you money. In brass wire alloys for cold-heading and upsetting, it gives a stronger, springier, more abrasion-resistant product. For more detailed information, write for Publication B-39. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

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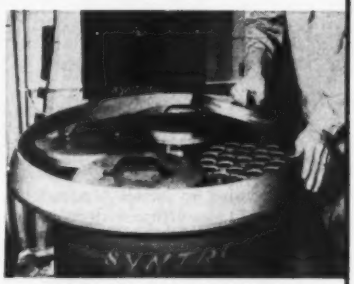

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CIRCLE INFORM-A-GRAM KEY NO. 30

. . . Panelists from page 28

good end results, however, are worth careful investigation and testing of these tool materials.

The principal advantages of ceramics, said Barnes, are their high hardness and their resistance to high temperatures. Ceramics have been successfully run with the tip red to red-orange for 30 min and longer, although normal cutting conditions do not elevate the tip temperature to this degree.

Ceramics, claimed Barnes, have been effectively applied to the machining of SAE 4340 (Rc50) and other hard steels at speeds of 500 sfpm. On the other hand, ceramics have not yet met with any particular success on stainless steels and comparable high-temperature alloys.

On high tensile materials such as 4340, casting or forging, Moore reported, ceramics will take finishing cuts at a lighter depth and higher speeds and feeds than carbides with considerable success. Watervliet Arsenal, added Barnes, is making extensive tests with special ceramic tools on the machining of 4340 gun material of 425-475 Bhn. Preliminary results are very good, although there is no assurance at this point that the job conditions can be duplicated.

Ceramics are still premature for general jobbing work, agreed George Moore. He said spindle speeds on most machine tools are too limited and, where we can get high enough speeds, the bearings will not hold up.

On facing operations where the part is held rigid and other conditions are satisfactory, ceramics hold up very well. On interrupted cuts, ceramics are still lacking; he recommended staying away from such cuts, but said that some success had been experienced on eccentric cutting where an out-of-round condition permitted the tool to barely leave the cut befor easing back into the metal.

The machining of fiberglass reinforced epoxy resins is one of the new areas of application for ceramics, said Barnes. Here, as on other non-ferrous applications, the tools should not have any negative rake as required for steel; a positive rake or neutral rake and a high relief angle (in the order of 15°) should be employed. Most ceramic applications to date have been on single point lathe tools.

George Moore said that ceramics can be ground with good results using a 220-grit resinoid bonded diamond wheel. All edges of ground ceramic tools must be honed. Barnes

. . . *Continued on page 33*

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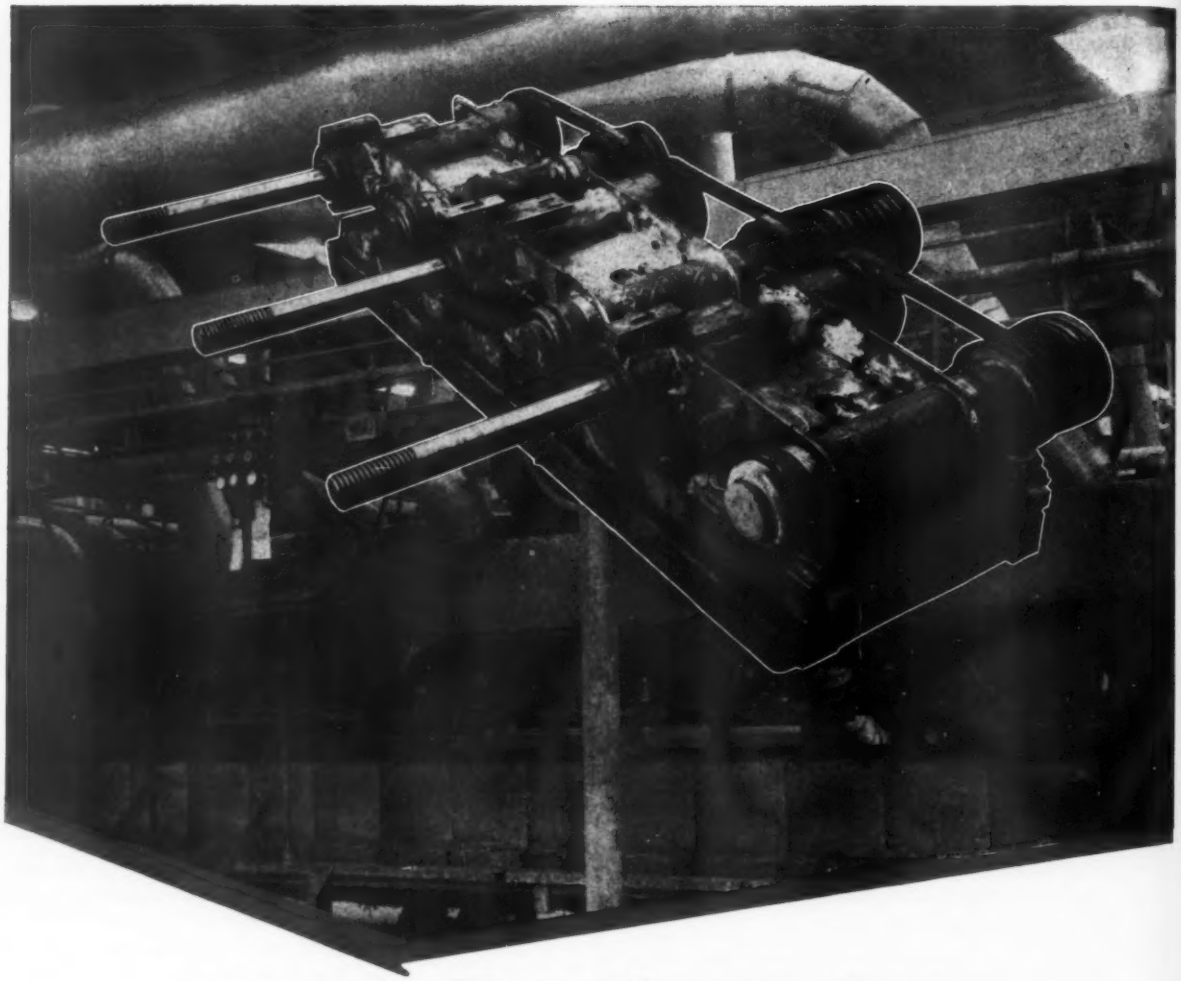

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A well known automotive stamping plant designed and built this tandem buffing head (shown above) for its own use. Due to the extremely high concentration of metal dust from the buffing and polishing wheels conventional bearings had a very short life. Over 300 bearings were purchased in 7 months. Downtime due to bearing failure was very costly. The actual labor and material cost of replacing the bearings during this period exceeded $3,000! Since the new bearing units designed by Bearings, Inc. (shown enlarged) were installed, no bearing failures have occurred and no replacements have been installed.

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CIRCLE INFORM-A-GRAM KEY NO. 32

... Panelists from page 30

mentioned that grinding of ceramics with silicon carbide wheels is not feasible, and, where attempted, has led to the loss of tips. When using a diamond wheel a high feed and plenty of coolants is recommended.

Adhesive bonding of the ceramic tip to a steel shank is practical, explained Barnes, when the tool is applied to light cuts on metals where no appreciable heat is generated. But on steel there is sufficient heat generated to reach and soften the bond even though the tip itself doesn't transfer any appreciable heat. He stated further that conventional brazing of ceramic tips has produced very consistent results — 99% failures. Most presently available epoxy adhesives are limited in their application to lathe tools for cutting metal because of their inability to withstand more than about 200°F for any appreciable length of time.

In the laboratory, some brazing of ceramics has been done successfully, said Barnes, by the use of titanium hydride metallizing of the ceramic permitting a better bond. Possibly alloys that melt around 500° (solders) would eliminate the problem of difference of coefficient of expansion between the ceramic tip and the metal shank, and could be substituted for the epoxy adhesives. There does not seem to have been much need to date for use of adhesive.

Mechanical holding is still the preferable and most prevalent method of attaching the carbide. Moore added that the throwaway type is preferred for the use of ceramics. "We like to hope we'll eventually have 10% of the cutting tool market," stated Barnes, arguing for ceramics. The two primary target areas are: first, continuous cuts of a finishing nature, and second, most types of cuts on non-metallic materials.

"There seems to be no question but what ceramics will make great inroads on carbides, especially where the harder grades of carbide have always been used," claimed Vascoloy's George Brennan. "We're glad that someone else is taking over these applications. They'll get 5-10% of the business, and 90-95% of the headaches."

On Diamonds:

Diamonds are being profitably used for the turning of metals, according to Joseph Klipper of Clipper Diamond Tool Company, but are not used on steel because the diamond tends to chip on such materials. Diamonds will show to best advantage on finishing non-ferrous materials to tolerances such as 0.0001" where they will usually exhibit a life of 10, 20, or 30:1 over other cutting materials.

Orientation of diamonds is not new, said Klipper, because diamond must be cut with the grain; it is not isotropic. However, the function of proper diamond orientation in single point cutting tools is having a rebirth of interest. Using X-ray defraction methods, good orientation is now giving an increase in life of 2 to 3 times that experienced with the diamond as originally set without use of modern techniques. Typical of the materials being machined with diamond tools are the aluminums, brasses, and some kinds of bronze, on which micro-inch finish of 5 to 6 is very common. Plastics too are being machined with diamonds, but only where an extremely close tolerance is required. This requisite, of course, applies to other work materials as well.

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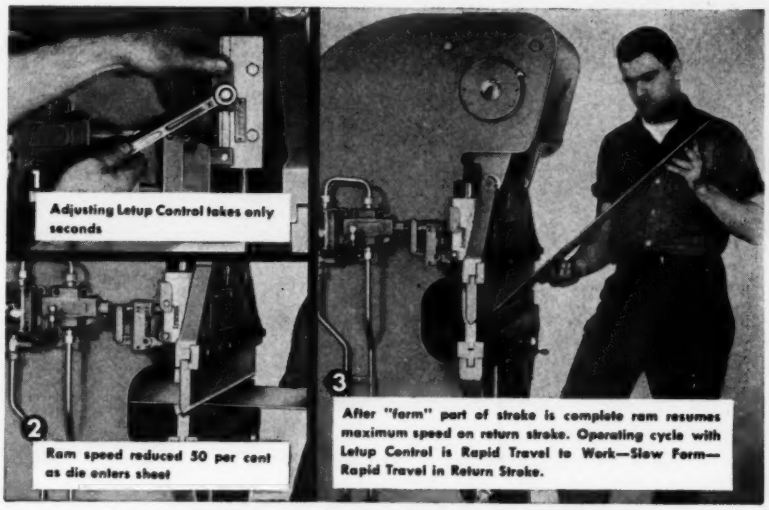
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CIRCLE INFORM-A-GRAM KEY NO. 34

How To Win Friends and Influence P. A.'s

THESE ARE DAYS not only of the hard sell — but the hard buy. Your sales personnel have to dream up and use every trick in the bag in order to get a hearing. The cordial, friendly approach is impossible to beat, but it has to be a two-way street. In other words, not only must your salesman be cordial and friendly, but he must be cordially welcomed by the friendly purchasing agent. That relationship is worth slightly less than a million bucks.

In putting across the story of cost-cutting, increased productivity, machine capability and material savings which your equipment makes possible, your man cannot just barge in on the P. A. and inquire as to his grandchildren. He probably isn't old enough to have any.

No longer can your star salesman fortify himself with the latest jokes from Captain Billy's Whizz Bang because (alas) it has long since disappeared from the news stands and train butchers' baskets!

Nor does your man dare to inquire as to the P. A.'s stunning wife — she probably left him two days ago.

If, in matters of love, the way to a man's heart is via his stomach, surely as regards getting a hearing for your pitch, the way to a P. A.'s ears is via his hobby.

This does not mean, if he is an ardent fisherman and still in a glassy-eyed trance from the 6-lb trout he caught last vacation, that your man is going to improve the situation by bragging about his 7-lb trout! That's slow death, and another sale down the drain. Diplomacy — painless diplomacy — is the order of the day.

Realizing then, what safe grounds you are on when "softening up" a P. A. with a conversation piece about his hobby, you can take your hats off to an ingenious and masterful project undertaken by the Allmetal Screw Products Company of Garden City, Long Island.

They questionnaired 6,200 industrial purchasing agents as to their hobbies, and (let this be a lesson to you) just to show how ready, willing and anxious a man is to talk about his hobby, they received responses from 4,136 or 66.7%! Let your direct mail crystal ballers try that for size!

It shouldn't be news that 1,352 (32.7%) P. A.'s pegged fishing as their hobby, or that 1,042 (25.2%) tell their wives what a hard day they had at the office when actually they were on the golf course.

Another 558 (13.5%) are shutter bugs and would rather buy a camera accessory than shoes for the kids.

At the other extreme are 598 (14.5%) P. A.'s who are so busy thinking up reasons for not buying your products that they have no hobbies. They're the characters who won't know the recession is over until they have to stand in line 12 months for your deliveries.

Aside from the fact turned up by the survey that the average number of hobbies per P. A. is 2.19, the amazing and fantastic angle to the whole story is that 191 different hobbies were disclosed. And, believe you me, they range all over the lot. To mention but a few: archery, geology, sewing, knitting, mathematics, beekeeping, weight lifting, maps, cryptography, daemonology, foreign correspondence, goat raising, free ballooning, economics (a true P. A.!), poetry, and police and fire departments! You name it — they do it!

We're a bit afraid that our friends at Allmetal Screw Products Company, Inc., 821 Stewart Avenue, Garden City, Long Island, N. Y., have their necks out on this one because they offer to send you additional information about the survey or a specific hobby. A note to their advertising department will bring you some fascinating facts on the life of a P. A.!

In other words, your salesmen today must be very erudite, cultured, versatile and gregarious men of the world — the P. A.'s world, that is.

But, for when they meet up with the P. A. whose hobby is creative dancing, we find ourselves fresh out of advice! They're strictly on their own. They'll probably run — not walk — to the nearest exit!

E. Willard Pennington

editor

New Lamina Wear Plates Last Longer, Cost Less!

Now . . . save money and get better performance wherever you have sliding contact between flat metal parts! The principle of bronze electroplated on a steel backing originated with Lamina Bronze-Plated Guide Pin Bushings. Proven during countless millions of punch press hits, it is now being used successfully to produce flat wear plates.

This new concept in wear plate design combines the low cost, ready machinability and solid backing of steel with the long-wearing, non-seizing, free-running properties of a copper-tin bronze alloy. Lamina Bronze-Plated Wear Plates are flat, parallel, and can be easily machined to suit your application. Standard sizes available from stock. End costly wear problems and reduce expensive downtime now! Write for complete information.

Lamina
DIES AND TOOLS, INC.
P.O. BOX 31, ROYAL OAK, MICHIGAN

MANUFACTURERS OF LAMINA GUIDE PINS, BRONZE-PLATED BUSHINGS AND THE FINEST PRECISION PROGRESSIVE AND LAMINATION DIES.

CIRCLE INFORM-A-GRAM KEY NO. 36

Here's how to make...

RUBBER STAMPS FOR PARTS IDENTIFICATION

... a Do-It-Yourself Project

by L. G. Harrison
Supervisor, Standards Publications
LINK AVIATION, INC.
Binghamton, New York

LINK AVIATION INC. HAS USED silk screen printing to mark electronic chassis for approximately ten years. Rubber stamp printing was introduced a year and a half ago. In this brief period of time, it is estimated that a savings of $20,000 to $30,000 has been realized by the use of rubber stamping. This cost savings can be appreciated by the accompanying break-down of the two processes.

	Silk Screen	Rubber Stamp
Preparation		
Material	$1.56	$.50
Labor	3.5 hrs	2.5 hrs
Life	1000 pcs	30,000 pcs
Production Run — Amplifier		
Setup	.75 hrs	.25 hrs
Run	500/8 hrs	1500/8 hrs
Production Run — Terminal Strip		
Setup	.75 hrs	.25 hrs
Run	300/8 hrs	650/8 hrs

In addition to the savings indicated, the baking operation necessary for the silk screen process has been completely eliminated by the use of rubber stamps.

With such savings, it can be readily seen why Link Aviation, Inc. switched to rubber stamping as a production method. In the manufacture of Link Aviation's Flight Simulators, we will use approximately 10,535 amplifiers (with terminal strips) in 21 simulators. This means a lot of parts identification.

The complete process for the preparation of the rubber stamp and the rubber stamping of a unit follows.

Fabrication of Rubber Stamp

1. Rubber Mat. Information to be placed on the stamp is engraved on aluminum — preferably 5052. In many instances it is not necessary to engrave the aluminum plate in the exact pattern of the information to be stamped. The reason for this will be described later. If the information is nomenclature, instructional information or part numbers, it may be engraved as it is to appear on the part or unit to be stamped. Figure 1 illustrates the raw gum rubber, the engraved plate, and the molded rubber.

Note: The rubber stamp unit originally procured for use in molding the rubber had a type setting arrangement whereby the information

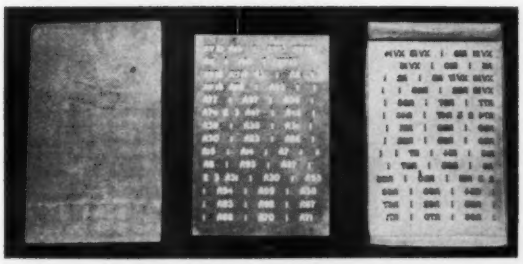


Fig. 1. The "makings" of rubber stamps. From left to right: a sheet of raw gum rubber; middle: the engraved aluminum (5052) plate; right: the molded rubber facsimile carrying the nomenclature of the aluminum master.

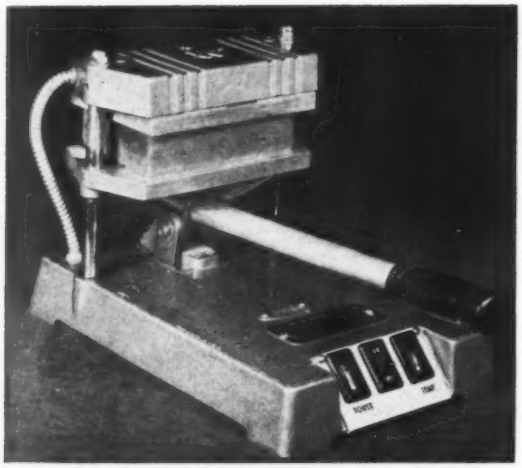


Fig. 2. A simple and foolproof electric heating press of 3" x 5" capacity (although this does not preclude making stamps larger than 3" x 5"). Between the press platens are put: the aluminum master; a sprinkling of mold release powder; and the raw gum rubber.

to be made into a stamp was set with type in a metal frame. A plastic mold was made over the type. The plastic mold was equivalent to the engraved plate. Making the plastic molded plate took time and it was found that the engraved plate had several advantages which were definitely beneficial. These advantages were:

A. Deeper cut, therefore a rubber stamp with higher letters.
B. Faster and more economical to make.
C. Larger selection of letter sizes.

2. Heating Press. A heating press is used to mold the rubber into the form desired. Figure 2 illustrates a small heating press.

After permitting sufficient time for the press to warm up, a piece of gum stamp rubber large enough to completely cover the engraved plate is selected (as indicated by Figure 1) and is placed over the engraved plate. Covering of the engraved plate by the rubber blank is necessary because the plate and rubber are compressed when placed in the heating press. If the rubber is too small, one or two edges of the rubber tapers to a fine edge.

The engraved plate and raw gum rubber are coated with a thin film of mold release powder before placing in the heating press. The engraved plate and rubber are placed in the heating press and compressed into place. The plate and rubber is left in the press for the designated amount of time.

The heating press used by Link Aviation, Inc. is the Warner Electric Co. Model No. 46. This press is limited to 3" x 5" plates. This does not prevent the making of stamps larger than 3" x 5", as will be disclosed later.

3. Rubber Stamp. The actual rubber stamp is now fabricated. Figure 3 illustrates the making of a stamp. The stamp is laid out corresponding to the part to be marked, as shown by the completed stamp. The desired designations are cut from the molded rubber. It is recommended that a heavy pair of shears be used in cutting. A very satisfactory pair is Wiss M3 shears. A thin piece of cellular rubber is cemented to the stamp in the area where the molded rubber is to be applied. The cellular rubber serves as a cushion. The molded rubber is cemented to the cellular rubber. The cement used is a rubber cement available at any stationery store. As mentioned, it is not necessary to engrave the plate in the exact pattern of the information to be stamped because the molded rubber elements can be cut and cemented into their desired locations.

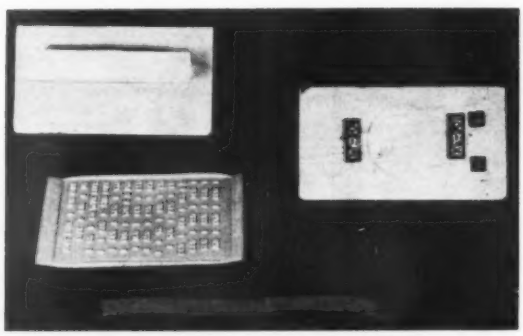


Fig. 3. For a given stamp, the desired bits of information are cut out of the molded sheet, cemented to a piece of resilient cellular rubber (foreground), which latter is then cemented to the wooden body of the stamp (right).

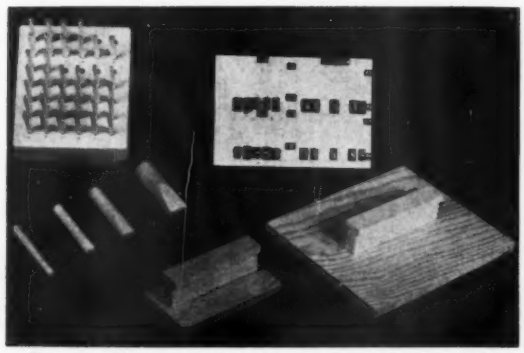


Fig. 4. Various styles of stamps which are easily produced by following the instructions in the text. The two basic styles are "sticks" and "paddles".

It was also mentioned that a stamp larger than 3" x 5" can be made even though the heating press is limited to a 3" x 5" plate. If it is necessary to make a stamp greater than 3" x 5", it can be accomplished by molding the rubber in 3" x 5" pieces and cementing them together on one stamp.

Rubber Stamp Styles

The rubber stamps may be of many shapes. Figure 4 illustrates several currently used in

production. The two basic types are the "stick" and the "paddle" which may be described as:
The Stick: Round or square pieces of wood, the size depending upon the information to be stamped. The completed stamps are illustrated on the left side of Figure 4. This type of stamp is used primarily for small quantity production or where it is necessary to mark information deep into a unit after assembly.
The Paddle: Various sizes of plywood cut to accommodate the part to be marked. The completed paddle is illustrated in the upper right corner of Figure 4. This type of stamp is used to stamp parts with various markings in one stamping operation.

Also available are commercial type blocks for making stamps. These are shown in Figure 5. The white card insert serves for identifying the stamp.

Stamping of Parts

Units and parts are stamped by using the sticks and paddles. The stick type stamp may have a single letter or number for building words, or it may have designations for marking a single unit for development work. The stick may also have a complete letter and/or number combination for marking such information

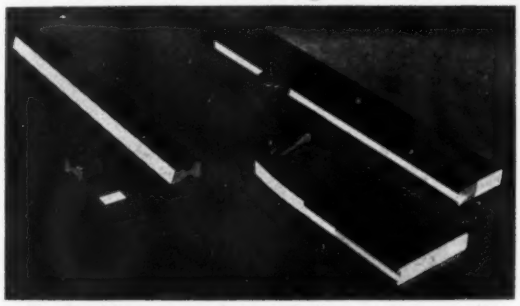


Fig. 5. Many types of stamp bodies are commercially available on which you can mount your own "do-it-yourself" molded characters. The white card inserts identify the stamps' messages.

as a reference designation, etc. Stamps with these types of information are illustrated in Figure 4. The stamping of parts with the stick stamp is a very simple operation. The stamp is inked and pressed gently against the surface to be marked.

For stamping of variously located designations on a part in one operation, a paddle is used. Figure 6 shows a paddle stamp for marking a resistor board. The board itself, after being completely marked, both front and back, is shown at the right and left of the paddle. As you will note, the paddle is a single paddle for marking both sides of the resistor board. Also note that two sides (the right and top) conform to the edges of the resistor board as the board is laid out on the paddle. This assists personnel in locating the stamp on the board.

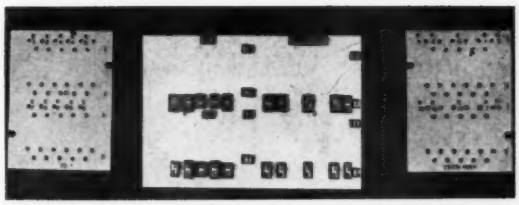


Fig. 6. A double duty stamp for marking the two sides (right and left) of a resistor panel. Note that the positioning of the stamp elements at the top and right edges of the "paddle" aid in locating the stamp on the panel.

Stamping parts such as an electronic chassis requires a more complex arrangement. Figure 7 shows the tool required to stamp an electronic chassis. This tool consists of the following six paddles:

Top Paddle
End paddles (two)
Inside paddle
Part number stamp
Code stamp

For stamping these units, provisions are made to prevent the paddles from shifting and thus giving blurred markings. Referring to Figure 7, note that the frame has two metal pins pressed into the far edge. These pins act as guides for the paddle which has two holes that register over these pins. The end paddles rest on the chassis flange and are guided squarely to the chassis by the wooden frame.

The inside of the chassis is marked by the paddle resting against the front of the wood chassis-marking fixture. Again reference is made to the chassis outline marked on the paddle to facilitate building the stamp.

Figure 8 shows the inside of the chassis being marked. The metal straps and springs hold paddle away from the part until it is pressed down for stamping. When released, the springs lift the paddle from the chassis. This is to assure a clean stamping. The stamp is guided squarely into place by the inner sides of the chassis itself.

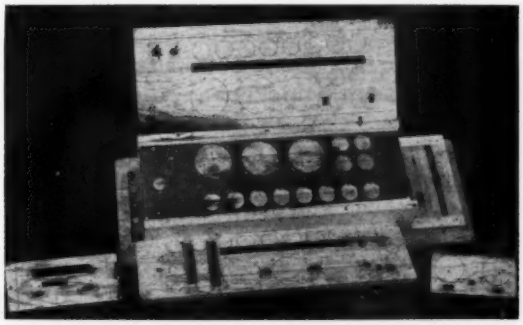


Fig. 7. A simple fixture for a complex layout of stamping on an electronic chassis which calls for symbols on the top, ends, and inside.

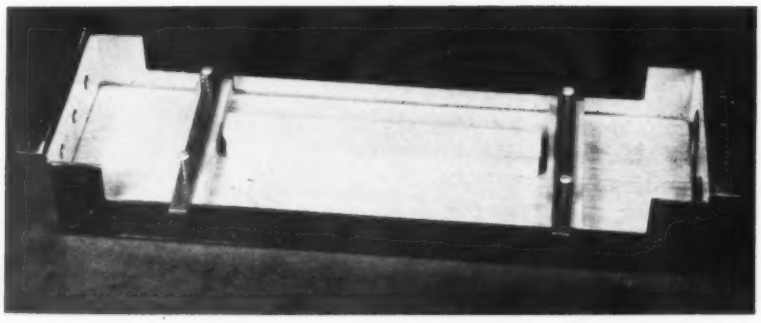


Fig. 8. The setup for marking the inside of the chassis of Figure 7. A clean impression is assured by the lifting action of the spring "strippers".

Ink and Ink Pad

The ink was selected after many tests. Since a large portion of the work performed is for the military it was necessary to review the ink relative to a military specification. The ink finally selected was a J. H. Matthews ink. This ink conforms to MIL-E-16557 and meets the marking requirements of TT-I-558, MIL-M-7911, and MIL-STD-130.

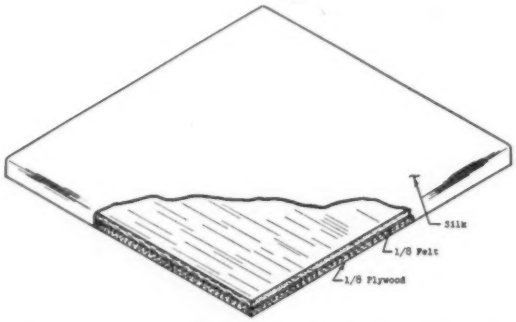


Fig. 9. The construction of an inking pad. The silk covering permits a lint-free impression. The J. H. Mathews ink used conforms to MIL-E-16557 and meets the marking requirements of TT-I-558, MIL-M-7911, and MIL-STD-130.

The ink pad used in production is made within our plant. The pad is made of a piece of wood approximately ⅛" thick. This piece of wood is covered with a piece of felt the same size as the piece of wood. Over this is wrapped a single layer of bulk silk material. Silk is the desired material as it is lint free and permits the passage of ink without any difficulty. Figure 9 illustrates the construction of a pad.

Ink is applied to the entire top surface of the pad. The pad should always be covered when not in use to prevent drying out. If the pad becomes dry, it requires considerable time to bring the pad back to a working condition.

In conclusion, we found only two areas that presented minor problems. Experience was the only way to obtain the correct answers to proper pressure and proper amount of ink.

end

INGENUITY AT WORK

Here's what Westinghouse Electric Corporation's TV-Radio Division manufacturing engineers did to an ordinary pair of clippers used to trim printed circuit board leads, and the results were astounding: two cuts/sec from eight o'clock to five without operator fatigue. The secret: a small air cylinder, a trigger, a few links of chain, a spring, a supporting frame. Put these together as pictured, and you'll have a power driven clipper that even the frailest woman on the production line can handle with ease all day long.

DESIGN CLINIC

Conducted by . . .
William E. Hoffman
Associate Editor

WHAT'S WRONG WITH THIS . . . . .

for Blind Hole Keyway Milling?

IN THIS BUSINESS we come upon many designs that are good, and a number that are bad. Then once in a while, we find some that are interesting, ingenious, born of an urgent need, with many unquestionable merits, but consisting of some principles that cause us to hesitate when tempted to present them to you. If we don't publish them, what about the lost singular merits? Or the lost stimulus to those who may be able to see "beyond", and clean up the design?

It's sad to lose all designs in this category, so we thought you would enjoy the exercise of picking a worthy few apart. Constructive criticism is good exercise, and your criticism here can run rampant without regard to job security or the feelings of others.

Below is the proposition for this session. Other designs will appear for discussion in future issues.

PRODUCING AN INTERNAL KEYWAY in a through-hole is normally an easy operation requiring a set of broaches. If the keyway is large, dictating overly expensive broaches, a slotting machine may be used. *But,* the machining of a keyway in a blind-hole is an unusual operation, requiring a different approach — at least if required for a production item. We have not seen the tool shown here, to judge for ourselves how well it works, but the user reports that it does, and tells about it below.

He says: if the product design will permit a radial runout for the cutter, it is possible to mill an internal keyway with this specially designed tool.

During its inception the big problem was "how to rotate the cutter down in the hole". With limited space we were restricted as to methods which could be utilized for this purpose. Bevel gears were our first most obvious approach. Or, perhaps the use of a worm-wheel drive? Either way, coupling the final drive to the cutter appeared extremely difficult, if not impossible. One thought led to another and, in keeping with the gear-drive principle, we decided to actually use the cutter teeth as gear teeth.

A description of the components used are as follows: The cutter body "A" is a long member resembling a large head-bushing, the head being used to control the depth of the keyway being cut and provide space for a coolant trough.

A slot is machined through the lower end of "A" for a running fit with the sides of the cutter. The slot is deep enough to permit some piloting of "A" in the workbore before the cutter begins to cut. A flat is milled on the head of the body so that engagement with a member of the workholding jig prevents "A" from turning while working.

A hole eccentric to the center of "A" was bored to receive the driving shaft "B", which is held in position by the retaining bush "C". "C" is a simple phosphor-bronze combination cap and bearing, threaded into "A" for retention. Running clearance with "B" was provided in "C's" center hole.

The driving shaft "B" has a Morse taper on one end and is bored in the opposite end to receive three small steel pins "D". Holes for the pins are bored on a calculated radius. These pins that drive the cutter are hardened, and care was taken to see that all three were

exactly the same length. The small holes for the pins are "flat-bottomed," which helped in making them identical as to their projection-length from the end of the shaft. Their contact-end is spherical for good cam action on the cutter teeth "E" assuring a smooth drive.

This cam action against the properly ground relief face of the cutter teeth causes the cutter to rotate and thereby cut a keyway.

The final detail of importance is the long key "F". This is a supplementary pilot following in the keyway as it is machined, in case of any undue clearance between the location "flat" on the body and the jig (not shown).

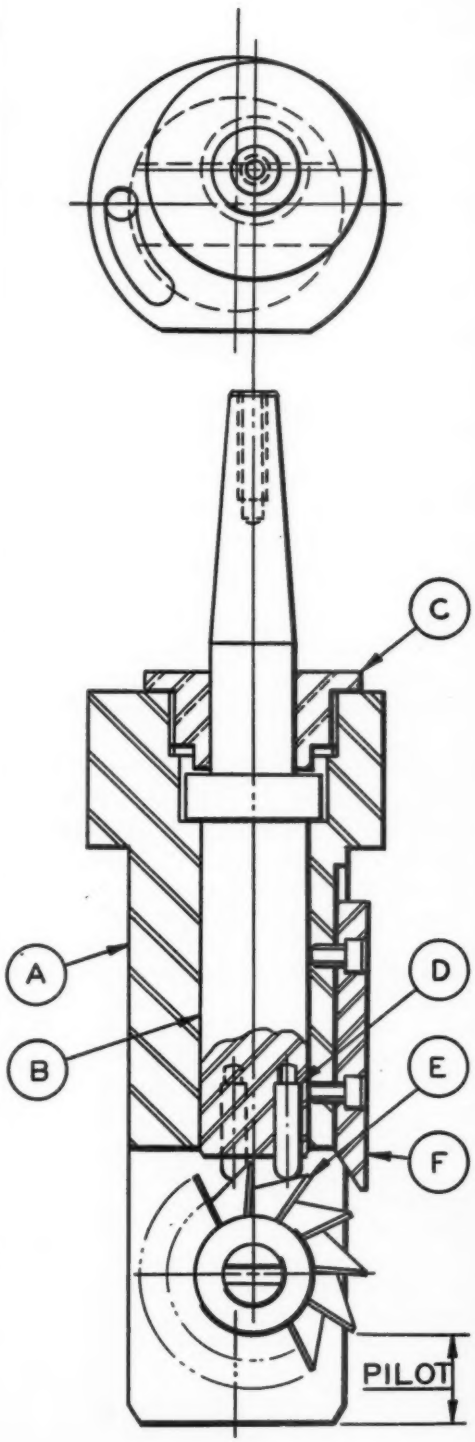
Coolant to cutter teeth is of prime importance in most machining processes, and in cases like this a liberal supply is always a problem due to the progressively greater cutter depth as the operation nears completion. At the start of the cut, the tool is above the work and an adequate supply can be flooded over it in the usual manner; but, as the cutter sinks below the surface, this opportunity is no longer present.

Fortunately the body was necessarily large to allow drilling a deep vertical oil-way to connect with the cutter slot, and a trough is milled on top. The trough provides a good delivery of oil to the oilway. We found oil to be the best medium, since we needed lubrication as well as cooling.

Cutter design is orthodox with the exception of two side hubs incorporated to prevent the teeth from rubbing against the sides of the retaining slot.

The axle on which the cutter revolves is hardened to resist wear and is a sf in both holes in "A". It bottoms in one and is secured by threads.

Normal milling speeds are performed with this tool, but it was found advisable to reduce the usual rate of feed by approximately half when machining mild steel. And although some experimentation was necessary before a smooth action was obtained, keyways are easily milled. Chatter is non-existent and operation for long periods without attention are experienced, except for cutter regrinds.



The premise of milling a keyway in a blind hole is well taken and we might say this approach to the problem is clever, but there are design characteristics and construction methods with which we would like to take exception. How about you?

Do you like the approach to the problem?
Do you like the way it has been worked out?
Do you like the construction?
Do you think it will work well? How long?

Or, if you think it is good through and through, and can find no bones to pick, maybe some of the ideas will be of value to you in your current work. At any rate, when you are through lauding or admonishing, take a look at some of our thoughts on the proposition.

What The Editors Think

OUR FIRST THOUGHT about this proposition of "milling a keyway in a blind hole" is: Don't do it! Just like the designer of the keyway miller shown here, we would go to the product designer and ask for some other driving means. Perhaps a cross pin, a flanged coupling, an external sleeve coupling, or one of the many types of universals may be permissible.

But, assuming that the product design can't be changed, for space reasons, or whatever, let's see what can be said about the design proposed here.

Unless money is no object (we're kidding) it must be also assumed that production is high enough to warrant special tool development, costs, and maintenance.

As working space decreases, as the bore decreases, the tool becomes less and less feasible. Another limiting factor is the depth of bore . . . although the trend to tubing for shafts and the like would be helpful in this respect.

Before thinking about its individual construction features, we wonder how well it works. Even though its designer says that chatter was eliminated, we wonder if he didn't, through his prejudice, construe this to mean the chatter was *much less* after development than during their first tries. However, the chatter might very well be eliminated if they utilized the time saving feature of grinding "B's" seat surface, to obtain the proper relationship of driving pins and cutter.

Although the calculations for establishing the pin bolt-circle, the pin diameter, the relationship of the centerline of "B" to that of "E", and other necessary factors, are not extremely difficult, there are many, we bet, who would rather "cut and try" than tackle them with pencil and paper. But, "cut and try" can be lengthy too . . . and expensive.

There would be more logic in spending time developing one of these tools if it could be used for a variety of hole sizes. But it's far from universal. Of course, if you need several sizes the second tool will be easier to make than the first, and so on.

It would be interesting to know what happens after the point contact between pin and cutter wears to line contact. Would there be a requirement for more power? Consequently, would it be necessary to decrease the feed as the speed decreases? This leads us to the question of cutter and pin wear and back again to chatter. We suspect that as the clearances within the tool become greater, chatter will increase and from a certain point on there will be progressively shorter cutter edge life.

Should the spherical radii on the driving pins not wear well, how much time can be afforded for the operation of regrinding and polishing before the operation expense becomes prohibitive? Setup for this operation is not easy, especially in the average toolroom. Then what about the job of removing the pins for this dressing? Or, can they be dressed in their holder? If they are to be removed, some other means than a pf should be provided for retention. Perhaps threads, and a shoulder to pull up against could be provided. A pilot length would be necessary and the shoulder could have wrench flats.

If it can be arranged to grind and polish the pins while assembled, consideration could be given to hard surfacing by brazing, and grinding could be to a fixed dimension between their ends and the shoulder bearing of "B" on "A".

Building up the pin ends is a good thought since this could make up for the clearance brought on when regrinding cutter relief faces.

Another fat question is, how do you get rid of the chips? The chip buildup ahead of the cut (in the bottom of the blind hole) depends on the depth to which you cut the keyway. The longer the cut the more chips to block the tool as it progresses toward the end. Oil flow would probably be carried into the cut by rotation of the cutter. Good. But how about the chips between the driving pins and cutter teeth? Wouldn't there be a tendency toward extra wear as a pin starts to drive on a chip and then rides off to hit and drive on the cutter tooth?

There may not be any great difficulty in making two oil holes and pressurizing the oil in one. In this way chips might be flushed out the other hole. This of course would require a seal between "A" and the work, and between "A" and "B". If oil under pressure were to be used as in gundrilling, it would seem likely that the key "F" could be done away with and more careful piloting accomplished between "A" and a fixture component. This would permit easier "sealing off" around "A" and the workpiece bore.

How many pieces could be machined before the need becomes apparent for a thrust bearing between "A" and "B"? All the cutter thrust is taken through this seat. We think the least that could be done would be to provide a more generous surface area here. Or, an impregnated bronze bearing material would be a cheap first-try construction.

Also friction and heat could be reduced if the bearing surface in "A" were relieved for a

distance, leaving a bearing at just the top and bottom of this hole.

The retainer cap "C" could be less elaborate since it really does nothing but keep "B" in place. It doesn't seem necessary that there be a sf between "B" and "C" on the diameter; a fit here would only tend to unloosen "C" if it had a right hand thread. Additionally, a pilot should not be located from a thread.

For that matter, it might be possible to eliminate the head of "A" and use its other end for a stop. Or a finger could be bolted to the top of "A", to project out as a stop on the top of the workpiece. Leaving off the head would allow "A" to be made from smaller stock.

Some of you who manufacture standard parts might want to consider this keyway milling proposition on a production basis. Immediately it starts to look better, doesn't it? Making something like this in quantity would cut the unit expense considerably.

It appears that sets of these for standard holes with standard keyways might be a good idea. Although this design would not seem to permit much overlapping of parts from one size to another, we're betting you can be more clever.

end

Perhaps you have a design that's good but for some reason or another it was abandoned, or perhaps you are doubtful of it. Send it in. If published, payment will be made to the contributor. Names will not be used. Address your design or comments on this month's discussion to William E. Hoffman, Associate Editor, TOOLING & PRODUCTION, P. O. Box 3505, Cleveland 18, Ohio.

Square Turntable Easy to Tool Up, Use

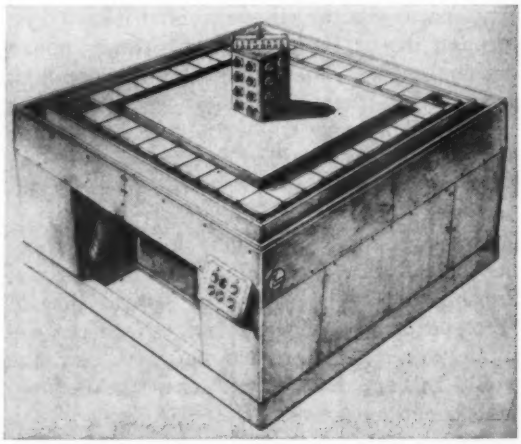
IT'S SOMETIMES HARD TO think of squareness when thinking of turntables, but judging from the features incorporated in the Kenhos "Four Footer" square turntable, it's worth a bit of thought. This transfer machine introduces four side operation for applications formerly in the field of round turntable machines, and makes it easy to mount the various standard portable power tools around it.

Parts can easily go sailing off into space when round turntables are started and stopped because of the forces built up in them when operating, says George H. Kendall, president of Kenhos Corporation and developer of the Four Footer. Not so with square ones. Tooling is confined to wedge-shaped areas on the outside of round turntables, he adds, and the area is quickly diminished as the number of stations is increased. Not so with the square turntable.

The Kenhos square machine has tooling mounting surfaces both inside and outside the line of travel of the pallets. This assures a great deal of practical operating room around the work nests. Each side has eight pallets and its own power hitch feed mechanism to move them.

For ease of tooling setup, all station wiring connections are located on the vertical column wireway at the center of the machine. A fault light indicator for all stations, visible on all four sides, is at the top of the column.

Mounting rails are standardized so all makes



A square turntable — a four-sided transfer machine has larger capacity than round tables, and makes tool mounting relatively simple.

of portable tools and power heads may be mounted easily and quickly by the shop mechanic. The top deck is 48″ square, ample for the mounting of power tools inside or outside, above or below, the pallet line.

A special feature of the Four Footer is the ability to handle a different product on each side of the machine at the same time with the use of pallets with four work nests. This is especially attractive on short run work in products with a series of different sizes. It is possible for the controls to run only one side of the machine with the other sides "off," so that extra production is practical without tooling changes.

end

TELECONTROL MONITORS YOUR PRODUCTION ...AS IT OCCURS

COMPLETE, CENTRALIZED CONTROL of production is now possible with Telecontrol, the production monitoring system developed by Control Systems Company, Division of Hancock Industries. Instantaneous communication of data from machines to a dispatch center, audio-visual communication between dispatch center and foremen and service personnel, and ability of machine operators to signal for immediate help are features of the system that give real meaning to the word "control" in production control.

While variations of the system are possible, let's look at a typical installation — one that's been in service for the past year with a savings of $20,000 in payroll downtime, substantial savings of raw materials, shifting of 16 people to other responsibilities, and many other benefits. The plant makes a broad variety of automotive parts involving press-work, machining, assembly, etc. About 200 machines are under control, and all operators are on an incentive system.

Each machine or production center (viz. an assembly bench, all people working as a team) is equipped with a sensing device of some kind that automatically pulses each time a workpiece is produced. This may be a limit switch, photo-electric switch, pressure switch, or some other device. This contactor is shielded so as to minimize tampering. At this point it should be emphasized that data is received so promptly that any false count can be readily detected while evidence is still available. Each machine is also equipped with a small control box, and is wired through a 24-volt system to the central control panel.

On the central control panel in the dispatch room, each machine is represented by a plug-in module unit which presents data from that machine as it occurs. Each control cabinet takes 20 of these modules, and a master cabinet will handle 10 cabinets or 200 machines. Features of the machine module are identified in the illustration above.

Production planning prepares a daily production schedule and individual job cards. The status of each machine whether set up or being set up is shown on the control panel by a job card, pulled by the dispatcher from an adjacent planning board. An operator assigned to the machine is represented by a plug-in key bearing his number. Time and production

Fig. 1. With Telecontrol, current time and count data from each machine is immediately available to the dispatcher. Trouble, order filled, and other conditions are visually and audibly announced. Overhead P. A. system permits dispatcher, from any point in the room, to converse with foremen, millwrights, or others.

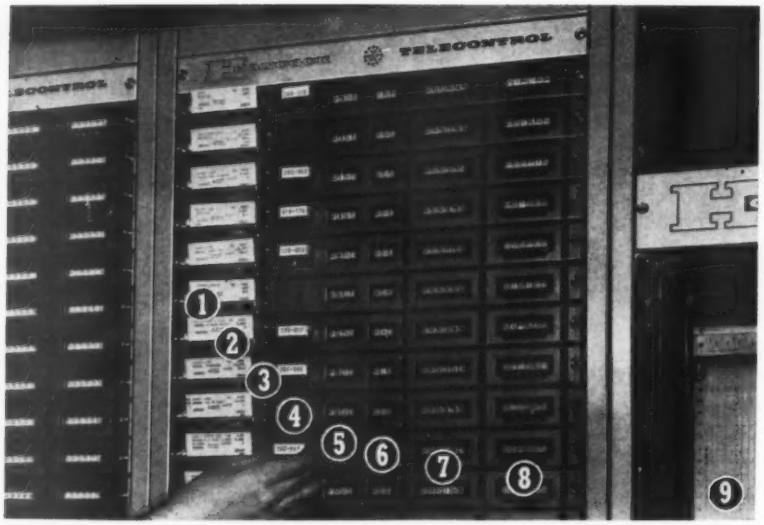


Fig. 2 . Modular construction of control panel features plug-in machine register units in banks of 20. The numbers superimposed on the vertical rows indicate the conveyed information and functions as follows:

① Job Order, Part and Operator Identification, Rate and Allowance Pcs/Hr. and Q't'y Req'd.
② Machine number.
③ Green Lamp — Indicates job is running. Red Lamp (steady) indicates job is down; (flashing) indicates help needed.
④ Operator Key. Inserted, starts cumulated time and permits counters to register.
⑤ Cumulated Production Time.
⑥ Cumulated Downtime (Idle Man Time).
⑦ Units Produced.
⑧ Order Balance (pcs-to-go).
⑨ Multi-channel strip Recorder (History of Productive and Idle Time on Most Critical Machines).

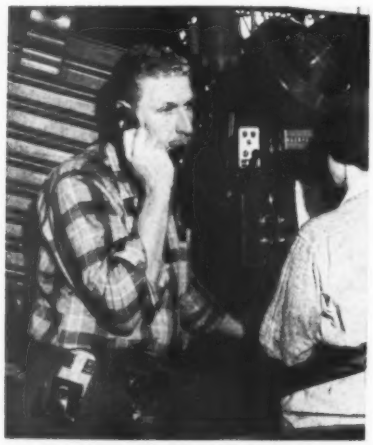


Fig. 3. Foreman, recognizing nature of trouble at the machine, phones dispatcher for help he needs. Phone carried on belt plugs into jack on machine's control box.

count can't be registered unless the operator key is in place.

A green lamp burning on the control box at the machine shows the operator that his time is being registered on the central control panel. A corresponding green lamp on the control panel indicates a normal condition for that machine to the dispatcher. If the operator sees that she is running out of stock, work is approaching the tolerance control limit, or anything else is wrong, she can move a toggle switch on the control box; this causes a red lamp on the control box and a corresponding one in the dispatch room to start flashing. It also causes an audible "beep" in the dispatch room. Over a public address system the dispatcher calls out the machine number; the foreman responsible for that machine immediately proceeds to it. In Hancock's own plant, it averages 15 sec for a foreman to reach the machine.

Arriving at the machine, the foreman plugs a phone (carried on his belt) into the control box. This stops the red lamps from flashing. On the spot he determines what is wrong and makes a decision as to whether the machine should be shut down or not. If a temporary shut down is in order, he inserts a key into the control box and locks it into downtime, this action prevents any further production from being recorded until he inserts the key to lock the machine back into production time. This also stops the cumulated production time register on the dispatch control board and starts the cumulated downtime register. During downtime, the red lamps on control box and on panel in the dispatch room are lit and the green lamps are out.

If the foreman needs help at the machine, by phone he asks the dispatcher to send an electrician, or materials handler, or setup man, etc. The dispatcher then locates the needed help and sends it to the machine. If the foreman decides to pull the operator off the job, he so informs the dispatcher and together they decide to what machine the operator should be re-assigned.

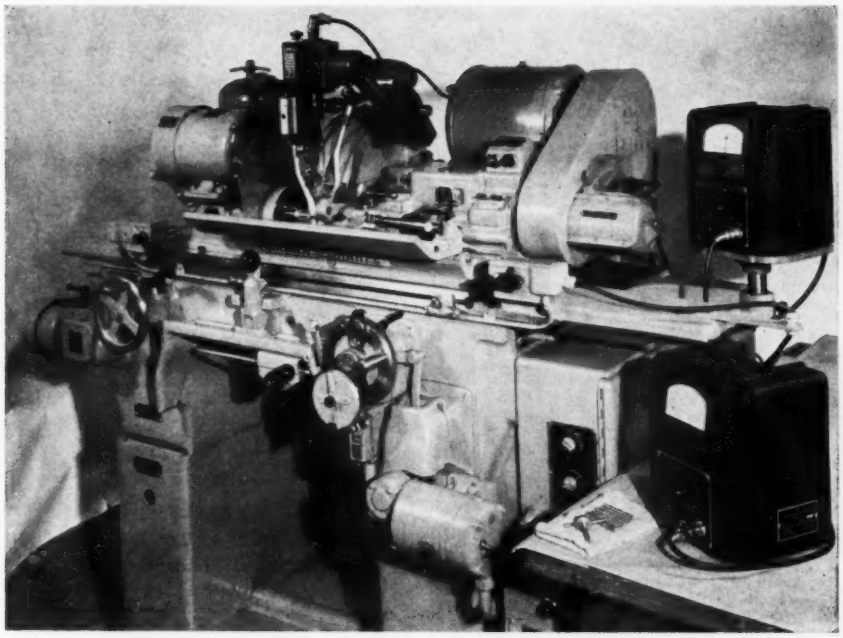
The dispatcher now pulls the operator's key from that machine module, thereby stopping all registers and inserts the key into the module machine where the operator is reassigned. However a magnetic operator number plate is left behind on the module from which the key has been removed. When time permits, the dispatcher then transcribes all data pertinent to that job, using a Friden punched-tape **printer**. Counters are reset and the magnetic operator number plate is transferred to the key in its new assignment.

When a balance register (pcs-to-go) on the control panel reaches zero, the green lamp for that machine in the dispatch room and on the control box at the machine starts to flash; there also is a buzzing sound in the dispatch room. The dispatcher now calls over the P. A. system the machine number "204-204-204-order out". This informs the foreman he must shut that job down immediately and reassign the operator. This one feature can provide enormous raw material and inventory savings where there are many machines converting strip, bar, or other such mill products.

At the end of a shift, a master timer shuts off all registers and the dispatcher copies off all data onto punched tape. This is fed to the punched-card accounting system, basis for payroll and production records. The old-fashioned time clock and timekeepers are eliminated hereby.

Work orders requiring many operations can be closely followed through the plant and serious lot shrinkage detected long before the shortage becomes a delivery problem.

Telecontrol is a highly efficient system with many advantages. It helps complete the production control fuction for the automatic factory . . . today. In conjunction with punched-card accounting and other modern concepts and techniques already in rather broad use, it has tremendous possibilities. end



PLUS OR MINUS 0.000010 INCH

THE COMBINATION OF MACHINE and instruments shown above has a capability of repetitive grinding to plus or minus 0.000010 inch. This capability results from a Brown & Sharpe research program devoted to the production grinding of small cylindrical workpieces to extremely close limits, plus a simplified mating of such pieces to equally accurate holes without any need for final lapping.

The machine is a No. 5 Brown & Sharpe plain grinding machine, which, by rigidly controlled manufacture and inspection verification has all elements aligned to the highest state of perfection. Special carbide-tipped centers and its "Electralign" electronic device for alignment of the swivel table further remove variables in capability.

The grinder is supported at three points on tempered spring isolation mounts which reduce the effects of external vibration. A standard coolant filtering and temperature control system is employed. The coolant is maintained at room temperature by simply setting a dial to the temperature of the room.

The schematic drawing shows how work of such precision is produced and monitored by the incorporation of two new B & S attainments, "CedaSize" and "Electromate".

CedaSize is a means of producing and controlling an extremely fine cross feed, with an electronic comparator caliper gage riding on the work, and an amplifier registering changes in work diameter in increments of a few millionths of an inch. Generously spaced graduations on the amplifier scale (increments of 0.000010") make small changes in work diameter easy to observe.

The Electromate development is combined with CedaSize when it is desired to grind pistons to mate with

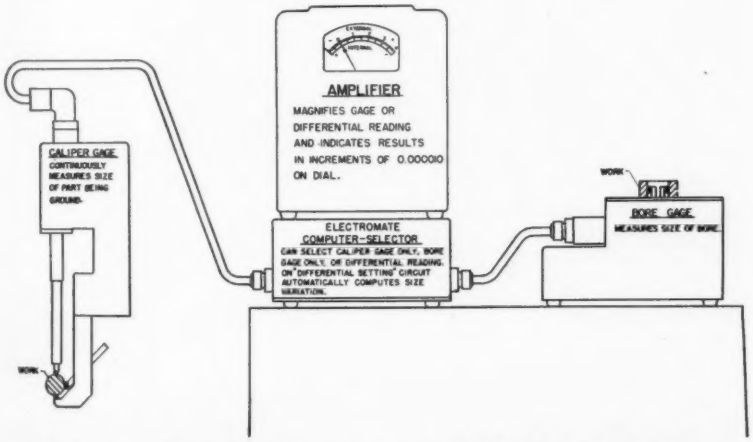

AMPLIFIER
MAGNIFIES GAGE OR DIFFERENTIAL READING AND INDICATES RESULTS IN INCREMENTS OF 0.00001 ON DIAL.
CALIPER GAGE
CONTINUOUSLY MEASURES SIZE OF PART BEING GROUND.
WORK
ELECTROMATE
COMPUTER-SELECTOR
CAN SELECT CALIPER GAGE ONLY, BORE GAGE ONLY, OR DIFFERENTIAL READING. ON "DIFFERENTIAL SETTING" CIRCUIT AUTOMATICALLY COMPUTES SIZE VARIATION.
WORK
BORE GAGE
MEASURES SIZE OF BORE.

Fig. 1. Schematic arrangement of the work-riding electronic caliper gage and amplifier of Brown & Sharpe's "CedaSize" system, and the "Computer-Selector" and bore gage of the "Electromate" development.

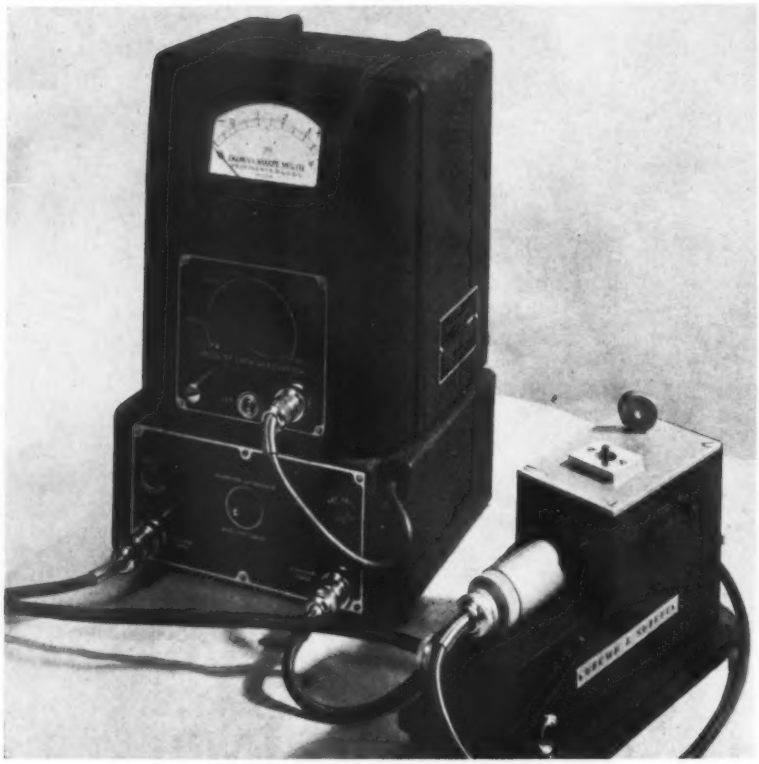


Fig. 2. With the "Electromate" bore gage telling the operator how far to go, and the "CedaSize" amplifier telling him how close he is getting, a semi-skilled operator can turn out parts that are ground to fit rather than having to be selected to fit.

bores within precision clearance limits. Included with the Electromate is a "Computor-Selector" unit on which the CedaSize amplifier is mounted, and an auxiliary bore gage, as shown at the right in the schematic drawing. This gage can measure bores from $^3/_{16}$" to 1" in diameter.

Selector switches on the Computor-Selector and Amplifier provide extreme flexibility for all types of precision grinding. With these switches, the dial on the Amplifier can be made to indicate, to any desired increment value from 0.0001" to 0.00001", any of the following:

1. The diameter of the piece being ground;
2. The diameter of a hole in a workpiece on the bore gage; and
3. The actual difference in diameter between a cylindrical piece being ground and the hole in a workpiece (on the bore gage) to which the cylindrical piece is being mated.

The measuring points in both the work-riding caliper gage of the "CedaSize" and the bore gage of the Electromate can be easily replaced and the units completely recalibrated by the machine operator.

This combination of a No. 5 Brown & Sharpe plain grinding machine with CedaSize and Electromate functions presents a simple and economical answer to a very complex problem — that of efficiently grinding to a few millionths and accurately mating pistons or plungers to holes, for missiles or any other purpose, on a production basis without the necessity of highly skilled operators.

end

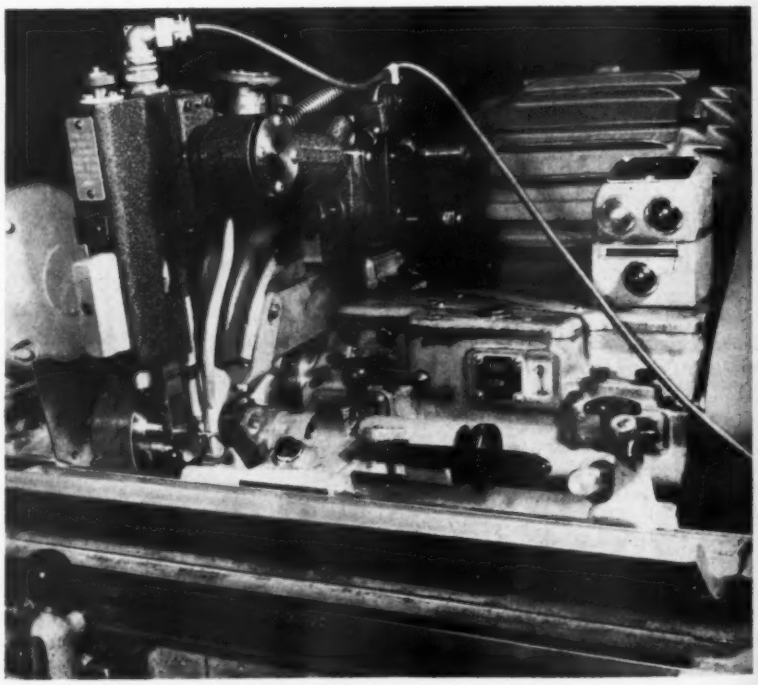
Fig. 3. Closeup of work area. From here a semi-skilled operator can:

(1) Plunge grind a group of suitable parts to any predetermined size within plus or minus ten millionths.

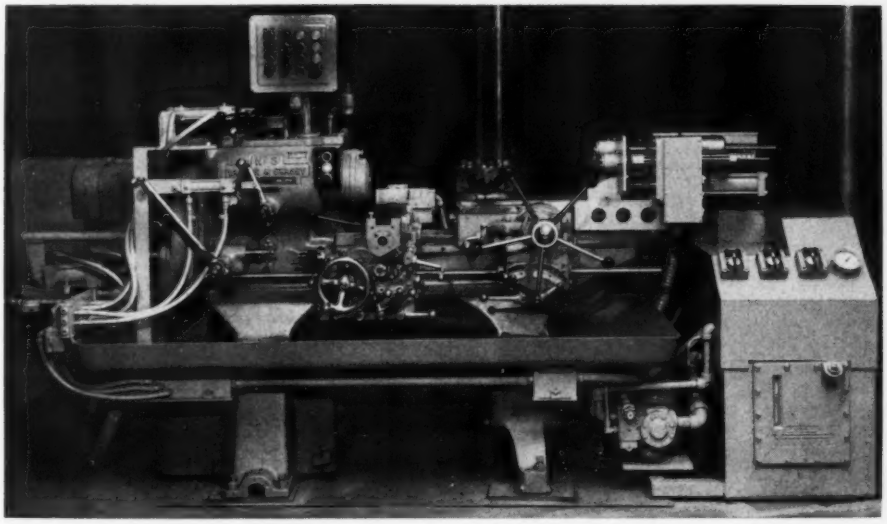
(2) Plunge grind a group of suitable parts to any predetermined fit in a group of mating holes within plus or minus twenty millionths (± 0.000020"), without making individual measurements and calculations, and even though the holes may vary in size by two ten thousandths (0.0002").

(3) Perform fitting or finishing operations on a group of similar parts, removing as little as ten millionths (0.000010"), stock or up to two ten thousandths (0.0002"), from each piece within an accuracy of plus or minus ten millionths (± 0.000010"). Once the setup is made, the amount of stock removed from each part can be varied within the above limits.

Parts may be taken from the machine, measured, and replaced in the machine where as little as ten millionths (0.000010") can be removed from the diameter.



AUTOMATIC PROGRAMMING



FOR TURRET LATHES

WHEN THE DE SILVEY DIRECTOR takes over, the operator of a turret lathe so equipped is free to perform other duties. Line inspectors may be assigned elsewhere because an experienced lathe operator can inspect his own work as produced, and can monitor or maintain his lathe's adjustments to hold to the closest tolerances.

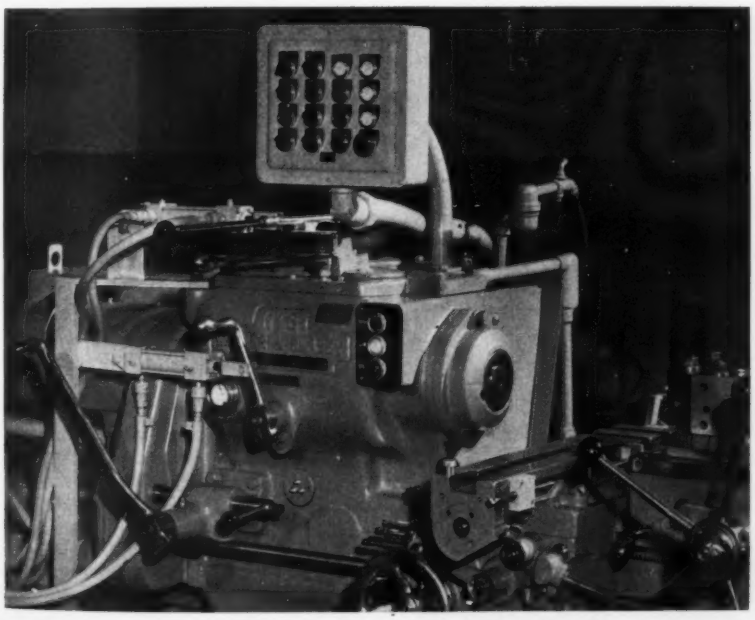


Fig. 1. Convenient to the operator is this control panel which governs all lathe operations whether fully automatic, semi-automatic, manual or intermittent.

A turret lathe "automated" by the De Silvey control unit can be operated in three ways: fully automatic, semi-automatic or completely manual. At the same time, the safety control features which are built into the Director protect the lathe, tools, and workpiece from damage to inadvertent operation — insurance against costly repairs and downtime, with resultant increases in productivity.

From the control panel, Figure 1, the operator can control all turret lathe operations whether automatic, semi-automatic, manual or intermittent. Hand or automatic operation, forward or reverse spindle operation, open or close collet, low or high clutch, hexagon turret and cross slide jog forward or reverse, at feed or rapid traverse, cycle start and stop, emergency stop and hydraulic pump are all controlled by the respective pushbuttons. The feed rate available with the De Silvey unit ranges from zero to a maximum of 100 ipm, and different feed rates can be established for front or back tool.

The headstock spindle speeds, ram, cross slide functions and all the operations are preselected by the six

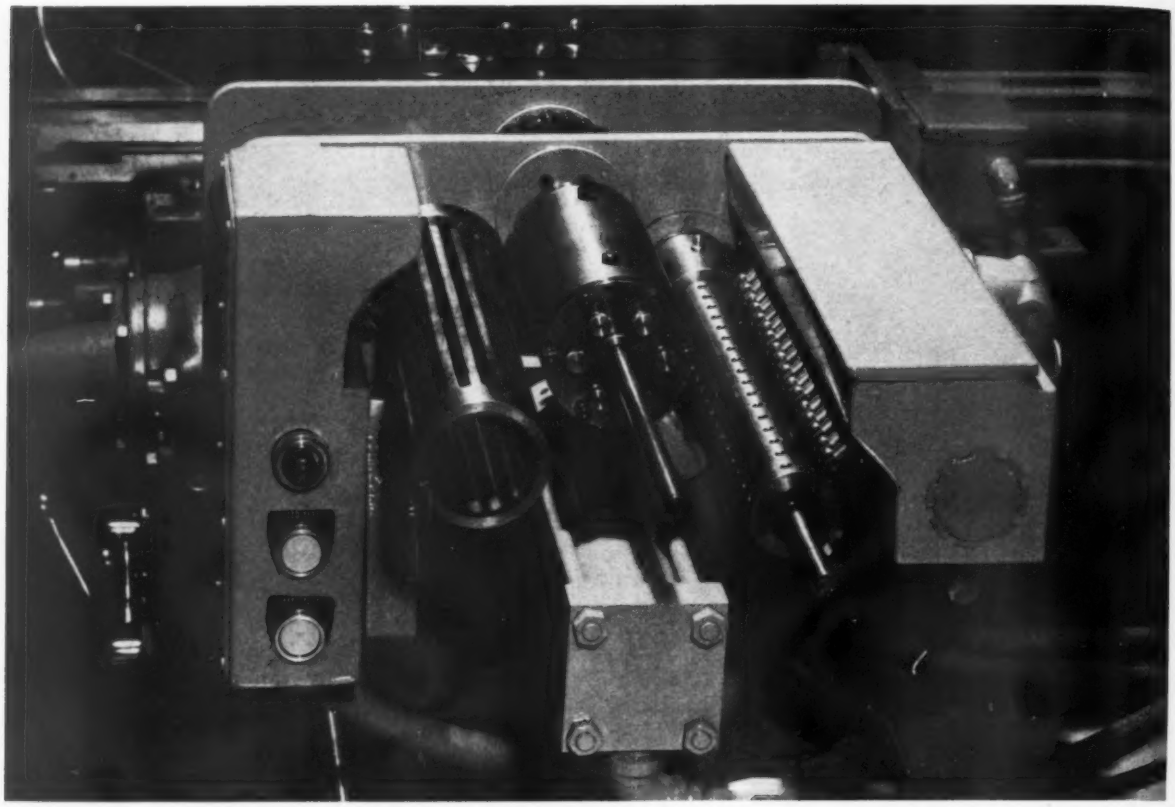


Fig. 2. The heart of the De Silvey Director. At the right is the drum which actuates switches governing headstock spindle speeds, ram and cross slide functions. The longitudinally slotted drum at the left programs the turret traverse, feeds, skip feed and back feed. The cylinder in the center houses the hydraulic circuitry needle valves for forward and back feeds.

position drum and multi-switch assembly shown at the right in Figure 2. The six positions of the drum correspond to the six hex turret faces, and each position energizes the switches which establish the functions to be performed at each turret station.

At the left, Figure 2, is the hex turret feed selector. This is a longitudinally slotted drum with three fully adjustable actuators for each hex face, eighteen actuators all told. This drum controls from forward rapid traverse to feed, from feed to forward rapid traverse, permitting skip feeding and is used for back feed when required. It also determines the point at which turret stops back feed.

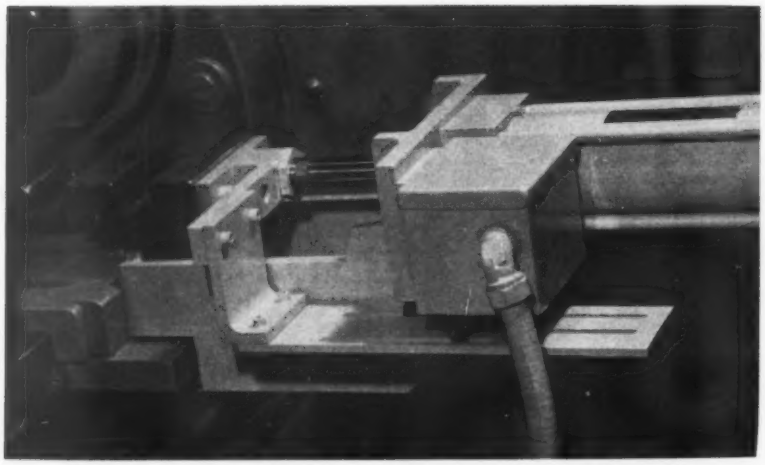


Fig. 3. Close-up of cross slide feed cylinder and slotted plate by which cross slide functions are actuated.

De Silvey's cross slide feed selector consists of a longitudinally slotted plate with three fully adjustable actuators, Figure 3.

The first actuator controls the point at which the front tool goes from rapid traverse into feed. The second controls the point at which rear tool goes from rapid traverse into feed and the third puts the cross slide in center position, allowing clearance for turret.

Among the safety features incorporated in the De Silvey Director is the overload eliminator which reverses the tool when the tool slides hit position dead stop and protects the tool and machine from overload when the tool is dull or broken. There is also an infinitely variable index cushion which prevents any over-travel of the turret head due to the momentum of heavy tooling.

end

Hard to Believe, But Here Is

ANGULAR POSITIONING ACCURACY OF 1/10TH SECOND

AN ULTRA-PRECISE DIVIDING HEAD should prove of extreme value as a production and an inspection tool in this age of ever-closing dimensional tolerances. Precision of arc measurement is herein attainable as a fast, practical routine shop procedure and of an order equivalent to the presently-practical precision of linear measurement.

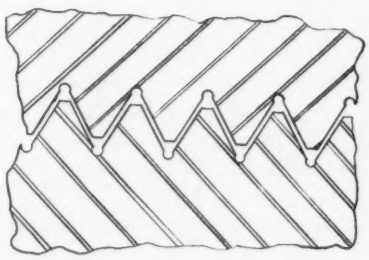
Developed by AA Gage Company, and marketed by Michigan Tool Company, the new dividing head indexes to an accuracy beyond the measuring capacity of the best current scientific procedures . . . an accuracy believed to be in the order of 1/10th of a second of arc.

Of remarkably simple and rugged construction, the head incorporates two mating master plates — each with 360 (ring-gear tooth like) serrations. At any one of the 360 settings, a positive locking arrangement brings all serrations on the two plates into full mesh, which would be impossible if any but the minutest error were present. The load is carried equally by all serrations, and any wear that occurs only tends to increase the accuracy of indexing. A simple cam arrangement separates the plates for indexing to the next position. In holding work for any machining operation it can, of course, be used in either the horizontal or vertical position.

Indexing any desired number of full degrees is accomplished quickly and requires no optically-assisted registry of engraved markings; approximate positioning is sufficient. Locking action completes the alignment of serrations; and there is no accumulation of error in a series of indexings.

For arcuate divisions reading in degrees, minutes and seconds an ingenious arrangement is provided. For such operations, an accessory top plate is anchored to the indexable member and is driven by it to the degree of arc required. But at that point, the accessory plate which is free to oscillate through one degree is precisely — and quickly — positioned to the plus or minus minutes and seconds required by using a combination of gage blocks to right and left of a gage pin secured to the indexable member. A precision slot in the periphery of the accessory plate permits this build-up of gage blocks and gage pin below the plane in which work is mounted.

In order to retain the inherent accuracy of the dividing head when fractionating a degree as described, AA Gage Co. is producing a set of 20 gage blocks graduated in 5-millionths of an inch.



Two master plates, each with 360 precision ground serrations, assure indexing accuracy much closer than one second of arc. Parrallelism and flatness of meshed plates is fast check on spacing accuracy.

Using one of the angle-checking interferometers recently developed at the University of Chicago, Michigan Tool Co. researchers have checked the head through all 360 settings and found it accurate to better than ½ second — which is as close as this instrument can be read reliably. **end**

Test setup at AA Gage is premised on the fact that accurate positioning error of 1/10 sec would give a linear deviation of 0.000006" at a 12" radius from center. Setup involves two 12" heads, one atop the other, with a 12" extension to permit checking on 24" dia. Lower head is indexed counter-clockwise and upper head an equal number of degrees clockwise. Cleveland Instrument Co.'s electronic indicator reads in millionths to give deviation from setting to setting. Repeated checks of this type indicate order of accuracy to be 1/10 sec.

More Versatile

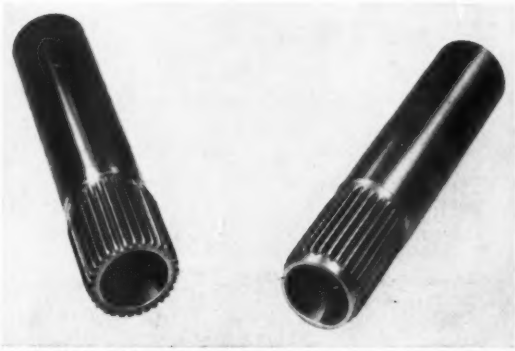
Low Pressure Spline Rolling

Good for Short Runs, Splines of Any Length, Tubular Parts

A NEW REFINEMENT of the Roto-Flo spline rolling process, using an axially-fed blank and reciprocating indexable cylindrical forming racks, requires lower separating forces, provides longer tool life, and permits the rolling of splines on thin-walled tubular shafts. A broad new field of design possibilities is thus opened to the product engineer on the basis of economic feasibility.

The setup developed by Michigan Tool Company is extremely versatile; equipment and tooling inexpensive and designed for multiple use, permitting application of the process to short-run production. The blank — solid shaft or tubing ½″ to 2″ OD — is fed axially at 1/16″ to ⅛″/sec between two fast-reciprocating, relatively short, cylindrical forming racks. The blank is free to be rotated in either direction by the reciprocating action of the racks.

Splines or serrations up to 12″ in length can be formed. Splines can be rolled on undercut parts, and even to within ¼″ of a square shoulder. A mandrel-type headstock center is used when rolling thin-walled tubes to preclude any possible distortion of the ID. Tubular parts having only 0.075″ wall, from tooth root to ID, have been successfully cold rolled. An operation developing only 3000 lbs separating force with the new process previously required 10 times that pressure using flat racks.



Refined cold rolling process is good for even thin-walled tubular parts like these. Low separating forces and mandrel preclude distortion of ID.

The new cylindrical racks are of high-alloy steel with the form ground annularly and all teeth of the same size. The rack is so mounted in its holder as to permit periodical indexing of the rack to bring into use an unworn longitudinal section of the teeth. Thus, each rack has considerably longer life. Further, the method of rolling the form and the low separating forces result in a long wear life per index. Racks may be used for any parts having identical tooth form and PD.

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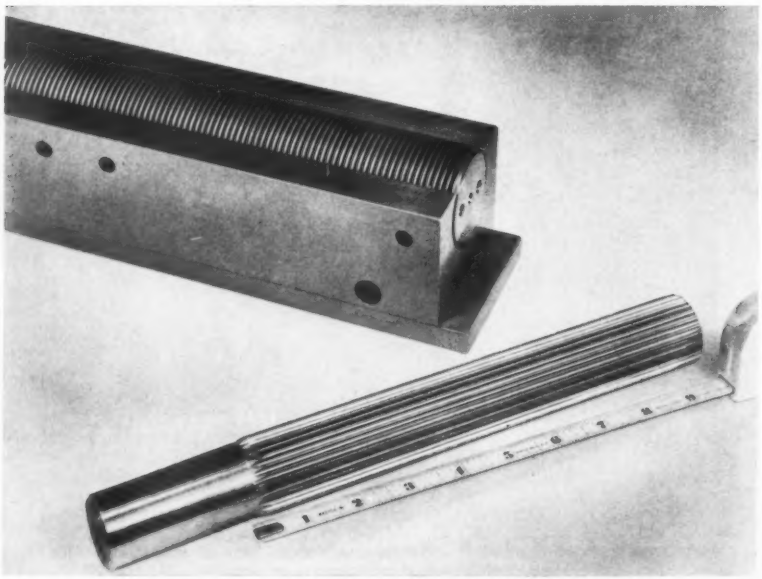
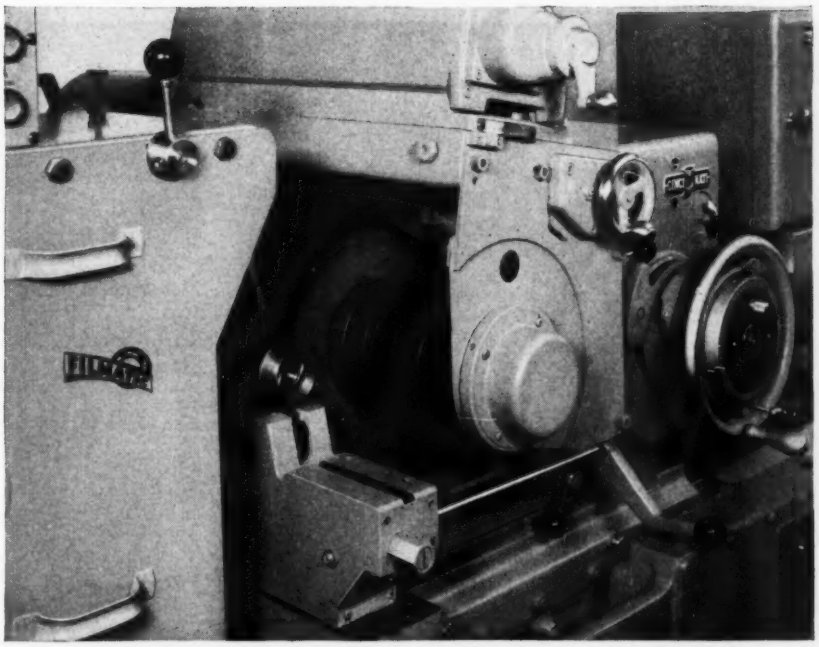


Cylindrical forming racks reciprocate rapidly over slowly fed rotatable work blank, providing gradual displacement of metal, thereby requiring low forming pressures. Racks can be indexed in holders for renewed life.



Several automatic features incorporated in this CINCINNATI FILMATIC No. 2 Centerless Grinder reduce nonproductive time in centerless grinding two diameters on turbine shafts.

Automatic Grinding Cycle Incorporates Wheel Truing

. . . on this Cincinnati Centerless

Give the operator an assist with nonproductive chores and he'll accomplish more. One way to do it is to *automate* as many nonproductive elements as possible in the cost of machining. Cincinnati grinding specialists proceeded along these lines in equipping a CINCINNATI® FILMATIC No. 2 Centerless to grind two diameters on turbine shafts. Automatic features for reducing nonproductive time include:

Automatic profile truing for grinding wheel, including cycle counter

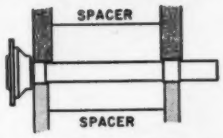
Automatic grinding wheel balancing

Automatic grinding wheel reciprocating, with truing interlock

Automatic Electro-Hydraulic Infeed

These cost-reducing features are in addition to well-known Cincinnati advantages such as bed rock mounting of grinding wheel spindle; FILMATIC grinding wheel spindle bearings; double slide support for the regulating wheel unit. Cincinnati is unquestionably the best buy for your precision centerless grinding work. Get additional details by asking for catalog No. G-644-3, or look in Sweet's Machine Tool File for brief specifications.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO



Drawing of part showing diameters ground.

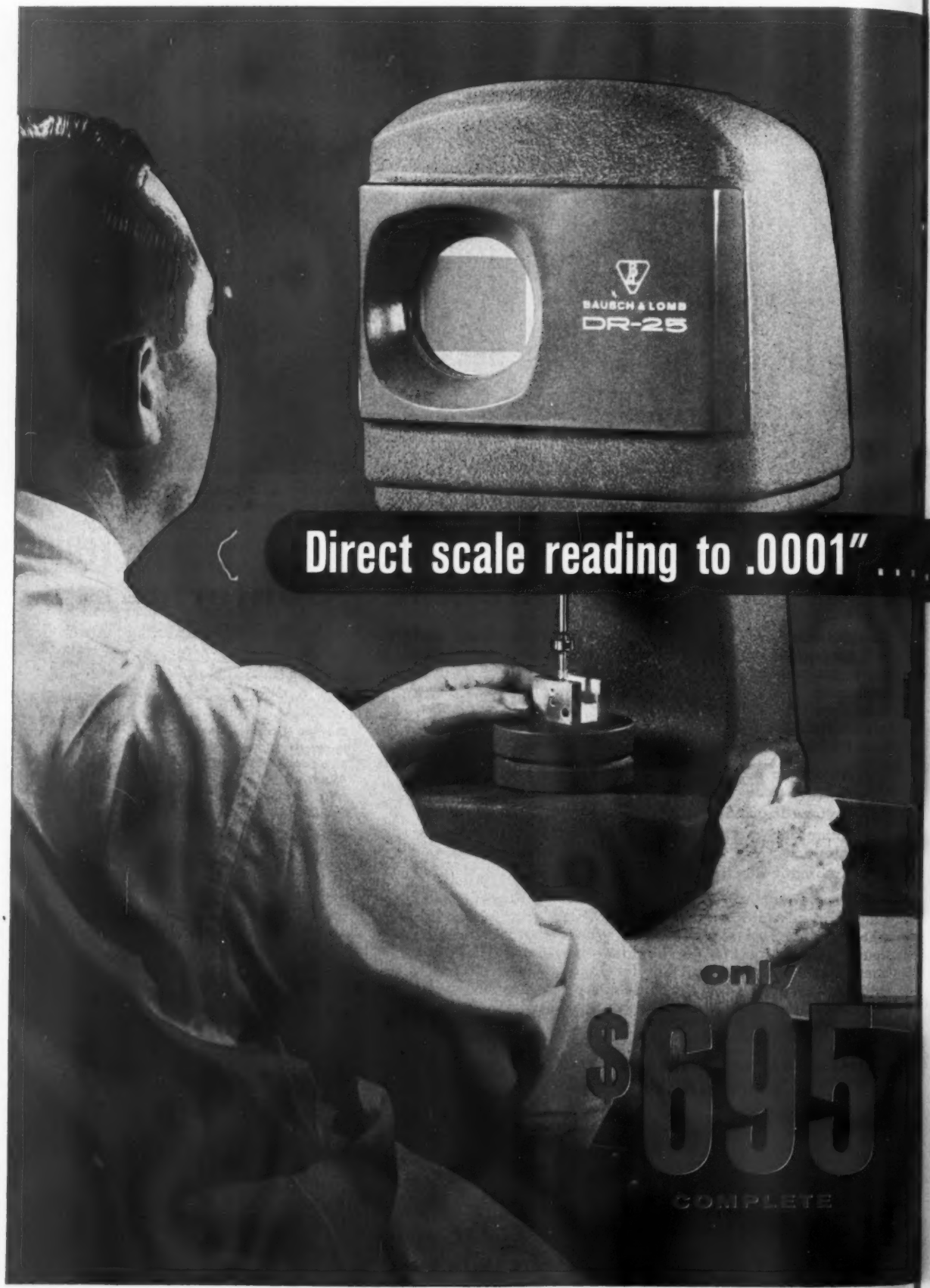
Production Data:

Part name	Turbine shaft
Material	Steel
Stock removal	.010"
Production	150 parts per hour

CINCINNATI®

CENTERTYPE GRINDING MACHINES • MICRO-CENTRIC GRINDING MACHINES
CENTERLESS GRINDING MACHINES • ROLL GRINDING MACHINES • SURFACE
GRINDING MACHINES • CHUCKING GRINDERS • CENTERLESS LAPPING MACHINES

CIRCLE INFORM-A-GRAM KEY NO. 53


BAUSCH & LOMB
DR-25
Direct scale reading to .0001"
only
$695
COMPLETE

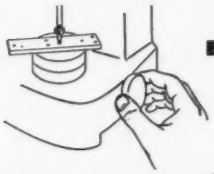
New!

BAUSCH & LOMB DR-25 OPTICAL GAGE

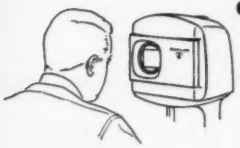
.....0" to 3" range...accurate to .000025"!

FAST, EASY AS A-B-C!

A Just set part to be measured on anvil . . . no masters or set gages needed.



B Turn knob to lower spindle . . . it will stop automatically on contact, with constant spindle pressure.



C See precise measurement at a glance . . . direct-reading scale is illuminated, magnified. No eyestrain, no conversion, no guesswork.

DEPENDABLE ACCURACY!

Direct readings to .0001"; keeps production to quality specification. Master scale ruled on world-famous B&L Grating Ruling Engine. Every DR-25 Optical Gage is accurate to 0.000025".

PRACTICAL, ALL-PURPOSE!

Direct scale measurement of depth, thickness, height, diameter, taper, angularity of surfaces, runout. Large work table makes it easy to adapt special fixtures. Deep (4¼") throat, open sides and large staging area accommodate widest variety of work.

ON-THE-JOB DEMONSTRATION!
NO OBLIGATION...
JUST MAIL COUPON TODAY!

BAUSCH & LOMB
SINCE B&L 1853

Distributed in the U.S.A. through the DoALL Co.

BAUSCH & LOMB OPTICAL CO.
79830 St. Paul St., Rochester 2, N. Y.

☐ I'd like a free on-the-job demonstration of the new B&L DR-25 Optical Gage, with no obligation on my part.

☐ Please send Catalog D-285.

NAME .....

COMPANY ..... TITLE .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

CIRCLE INFORM-A-GRAM KEY NO. 55

in ACE Drill Bushings
that makes the difference!

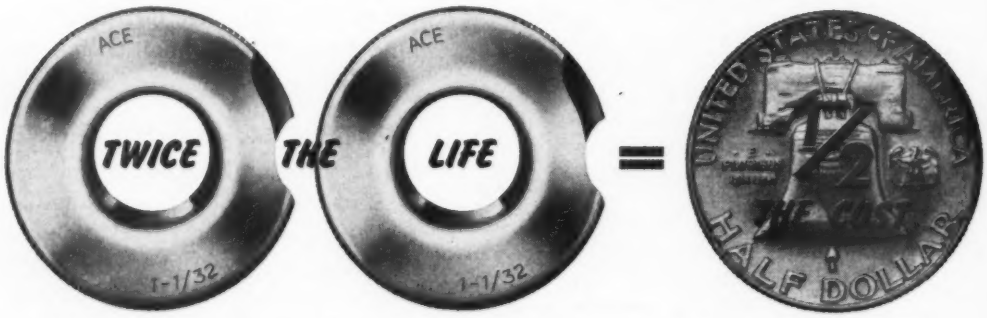
More than three years ago we began hearing such comments as, "Say, what's happening? Your ACE Drill Bushings just last and last." Others reported, "ACE Drill Bushings outwear all others". Someone wrote "ACE Drill Bushings cost us less because they last so much longer"

And then, two years ago, we told our secret. We confessed that we had been using a very special high-carbon chromium bearing steel. This new oil-hardening steel had proved to the users without our calling it to their attention, that ACE Drill Bushings were vastly superior in wearing qualities. As a result, the ACE plants were soon turning out these long-wearing bushings in ever increasing quantities.

To cope with the growing demand two additional factory warehouses have already come into being — one in Newark, N. J. to better serve the Atlantic States, and another in Detroit to benefit the Great Lakes area.

We invite you to try ACE Drill Bushings. Then you'll understand why ACE is the fastest growing name in the Drill Bushing industry. A comparative test, side by side in your own jigs — will convince you too, that *when working life is doubled — bushing costs are cut in half!* Fewer bushing replacements add bonus production savings. That's why ACE Drill Bushings of the new high-carbon chromium steel are being specified *exclusively* by cost-conscious tool men everywhere! Make a working comparison NOW with any other make bushing . . . and see "Positive-Proof" that *the steel makes the difference!*

Be Specific...
***Always Specify* ACE !**



Now! DETROIT OFFICE AND WAREHOUSE
TO BETTER SERVE THE GREAT LAKES AREA

Opened January 15, 1958, 10620 West Nine Mile Road, Detroit 37, Lincoln 8-0777

ACE Drill Bushings are stocked and distributed by leading Tool Supply Houses in all strategic industrial areas. Write today for new 1958 Catalog, Technical Information, Conversion Tables, List Prices, Quantity Discounts and name of ACE dealer nearest to you.

ACE DRILL BUSHINGS

NEW JERSEY
611 McCarter Highway
NEWARK 2
Mitchell 2-3006

ACE

HOME OFFICE
CALIFORNIA
5407 Fountain Ave.
LOS ANGELES 29
HOllywood 9-8253

ACE

MICHIGAN
10620 West Nine Mile Road
DETROIT 37
Lincoln 8-0777

CIRCLE INFORM-A-GRAM KEY NO. 56

DoALL Tool and Die Steel has the better finish

There is none FINER and it costs NO MORE!

DoALL Tool and Die Steel is precision-checked for a 25 micro-inch RMS finish or better.

Compare the Finish . . .
Compare the Analysis
STANDARDIZE ON DoALL

Air Hardening Tough Abrasive Jobs SAE Type A2		Oil Hardening Proven Analysis SAE Type O1	
Carbon	1.00%	Carbon	0.90%
Manganese	0.50%	Manganese	1.20%
Chromium	5.00%	Silicon	0.30%
Molybdenum	1.25%	Tungsten	0.50%
Vanadium	0.30%	Chromium	0.50%
		Vanadium	0.20%

THIS IS A TYPICAL DoALL STORE

Here Is Surface Finish That SAVES You TIME and MONEY

No need to penalize yourself with the extra costs and troubles of surface-grinding your tool and die steel—when DoALL does it for you at no extra cost!

All DoALL precision-ground tool and die steel is checked for a 25 micro-inch RMS finish *or better!*

This job-ready finish can cut your tool, die, gage and fixture costs at least 15% by doing away with all surface-grinding at your end. No chance for grinding spoilage, either. No waste.

Having more than better surface finish, DoALL Tool and Die Steel also rewards you with precise dimensional accuracy. Size is accurate to ±.001 thickness;+.005-.000 width, with squareness edge to surface .003 per inch of thickness.

Additional DoALL Benefits

- Scheduling is speeded—just ink it, mark it, cut it, use it!
- Machining is easier—saws to any shape on a band machine!
- Heat-treating is simpler—it's non-deforming and distortion-resistant!
- Delivery is faster—over 1500 standard sizes stocked and ready. Prompt delivery on special sizes—all handy through your local DoALL Sales-Service Store.

Stocked by friendly DoALL Sales-Service Stores in 38 cities. See your classified directory.

FREE GUIDE CHART GIVES 1576 STANDARD SIZES!

A valuable toolroom aid, complete listing of all standard sizes of air and oil hardening precision-ground DoALL Tool and Die Steels is conveniently given on this easily read wall chart. Send for yours now.

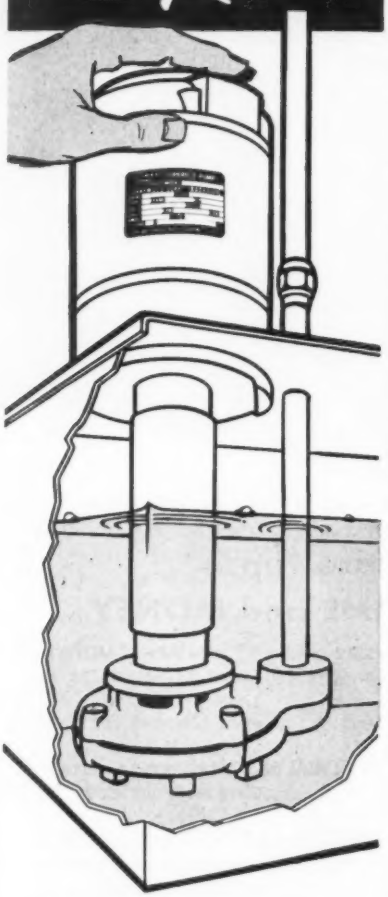
TS-17

The DoALL Company

Des Plaines, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 57

put a GRAYMILLS COOLANT PUMP on that machine and *Relax*



You'll get smooth, quiet performance, abundant volume, year after year, at less cost. They're dependable, abrasive proof, need practically *no* service. Interchangeable. Standard NEMA motors (also JIC Models).

Coolant pump shown is Model 33JL ¼ H.P. Get it from your Industrial Distributor.

WRITE FOR THIS NEW FREE CATALOG

Showing standard and JIC Model centrifugal and gear type 1/25 to 2 H.P. Pumps, Pumping Units, Accessories and helpful selection chart.

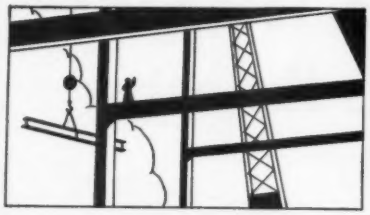
156

GRAYMILLS CORPORATION

3713 N. LINCOLN AVE.
CHICAGO 13, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 58

GROWING PAINS



The Milford Rivet & Machine Co. has announced the completion of new laboratory and research facilities which will be devoted to new methods and product development, as well as the development and refinement of manufacturing equipment and techniques.

A 11,400-sq-ft research and development building is being constructed by **The Cleveland Crane & Engineering Co.** and is scheduled for completion in June. The building will have an engineering department and complete shop and testing facilities for assemblies and testing equipment under development.

A factory in Closter, N. J., has been opened by **Electro-Autosizing Machine Corp.**, manufacturers of precision gaging and automation equipment.

Production capacity has been increased by about 75% by the completion of a $1,000,000 major plant expansion by **Buhr Machine Tool Co.** This expansion consists of two main bays — one devoted to heavy machining and the second to assembly of multiple-operation machines. In addition to new equipment, the plant's assembly wing permits the assembling and testing of several complete production lines at one time.

The Timkin Roller Bearing Co. is investing $3,000,000 on the modernization of the cup and cone grinding departments of its Canton and Columbus bearing plants, and for new major equipment for its Bucyrus Bearing Plant. Some 117 machines including cup and cone grinders, cone honers, and cup air gages, will be added to the existing equipment.

Construction of a 104,000-sq-ft plant for the **General Electric Computer Department** is underway in Deer Valley Park, near Phoenix, Ariz. Occupancy is scheduled for January of next year.

The new plant and laboratory facilities for **E. F. Houghton & Co.** have been finished. This construction more than doubles the plant size and provides horizontal and vertical compounding and mixing, stainless steel tanks for chemical processing, and control and testing facilities.

MEEHANITE CASTINGS ARE MADE ONLY BY MEEHANITE FOUNDRIES

The American Laundry Machinery Co., Rochester, N. Y.
Atlas Foundry Co., Detroit, Mich.
Banner Iron Works, St. Louis, Mo.
Barnett Foundry & Machine Co., Irvington, N. J.
Blackmer Pump Co., Grand Rapids, Mich.
E. W. Bliss Co., Canton and Toledo, Ohio and Hastings, Mich.
Centrifugally Cast Products Div., The Shenango Furnace Co., Dover, Ohio
Compton Foundry, Compton, Calif.
Continental Gin Co., Birmingham, Ala.
The Cooper-Bessemer Corp., Mt. Vernon, Ohio and Grove City, Pa.
Crawford & Doherty Foundry Co., Portland, Ore.
Empire Pattern & Foundry Co., Tulsa, Okla. and Bonham, Texas
Florence Pipe Foundry & Machine Co., Florence, N. J.
Fulton Foundry & Machines Co., Inc., Cleveland, Ohio
General Foundry & Mfg. Co., Flint, Mich.
Georgia Iron Works, Augusta, Ga.
Greenlee Foundries, Inc., Chicago, Ill.
The Hamilton Foundry & Machine Co., Hamilton, Ohio
Hardinge Company, Inc., New York, N. Y.
Hardinge Manufacturing Co., York, Pa.
Johnstone Foundries, Inc., Grove City, Pa.
Kanawha Manufacturing Co., Charleston, W. Va.
Kennedy Van Faun Mfg. and Engr. Corp. Danville, Pa.
Koehring Co., Milwaukee, Wis.
Lincoln Foundry Corp., Los Angeles, Calif.
Nordberg Manufacturing Co., Milwaukee, Wis. and St. Louis, Mo.
Palmyra Foundry Co., Inc., Palmyra, N. J.
The Henry Perkins Co., Bridgewater, Mass.
Pohlman Foundry Co., Inc., Buffalo, N. Y.
The Prescott Co., Menominee, Mich.
Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Ross-Meehan Foundries, Chattanooga, Tenn.
Sonith Industries, Inc., Indianapolis, Ind.
Standard Foundry Co., Worcester, Mass.
The Stearns-Roger Mfg. Co., Denver, Colo.
Valley Iron Works, Inc., St. Paul, Minn.
Vulcan Foundry Co., Oakland, Calif.
Washington Iron Works, Seattle, Wash.
Dorr-Oliver-Long, Ltd., Orillia, Ontario
Hartley Foundry Div., London Concrete Machinery Co., Ltd., Brantford, Ontario
Otis Elevator Co., Ltd., Hamilton, Ontario

SEND FOR YOUR FREE CASTING DATA SHEET

TD-1 "WHAT IS MEEHANITE."®

Write today to Meehanite Metal Corporation, Department 28, 714 North Avenue, New Rochelle, New York.

MEEHANITE®

CIRCLE INFORM-A-GRAM KEY NO. 59

Meehanite castings possess exceptional strength properties and toughness

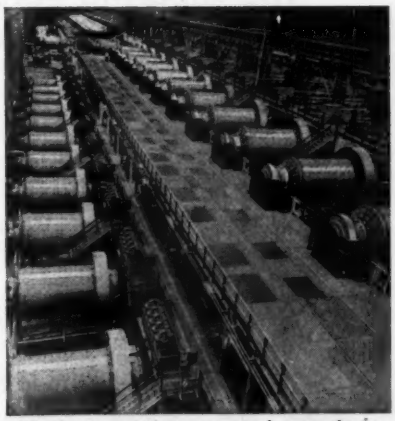
This one-piece Meehanite casting is the feed end head for 10′ diameter Nordberg Ball and Rod Mills used to reduce hard, abrasive Taconite Iron Ore to the fineness of flour.

In service, each trunnion supports a continuously rotating and shifting load in excess of 200 tons. Though subject to heavy moving stresses day in and day out, Meehanite metal possesses the mechanical properties necessary for long continuous operation.

In addition to uniform solidity and capacity to absorb vibratory stresses, Meehanite castings exhibit high endurance values and exceptional freedom from notch sensitivity. The endurance limit of Meehanite® is higher in relation to tensile strength than most other materials — it approximates 45 to 50% of the tensile strength — thus providing engineers with a larger margin of safety.

Meehanite metal finds wide application in the manufacture of many components subject to heavy moving stresses and dynamic loads.

For additional engineering information write for your free casting data sheet: TD-1 "What Is Meehanite."®



Meehanite castings are used extensively in each of the 58 Nordberg Grinding Mills shown installed in an ore concentration plant up in the Iron Range of Minnesota.

MEEHANITE BRIDGES THE GAP BETWEEN CAST IRON AND STEEL®

MEEHANITE METAL

MEEHANITE METAL CORPORATION, NEW ROCHELLE, NEW YORK

CIRCLE INFORM-A-GRAM KEY NO. 58

check the press–check the price

the Clearing Torc-Pac 22 O.B.I.

What do you want in a 22 ton O.B.I.?

Dependability, quiet operation, rigidity, accuracy, a trouble-free transmission and drive?

All these features and more have been incorporated into Clearing's new Torc-Pac 22 ton O.B.I.

The Torc-Pac 22 is compact, readily portable, complete with all necessary controls—ready to operate when you receive it. And it has a high performance, wet disc **air-friction clutch and brake** all wrapped up in a sealed-in-oil drive. Read more about it on the next page.

Why not find out more about this low priced press today. Write Clearing and ask for Sales Bulletin No. 19.84.

Also available in 32 & 45 ton capacities

CLEARING PRESSES

the way to efficient mass production

CLEARING MACHINE CORPORATION *division of* ***U.S. INDUSTRIES, INC.***

6499 W. 65th Street—Chicago 38, Illinois / Hamilton Division, Hamilton, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 60

CONCISE GUIDE TO PLASTICS, by Herbert R. Simonds. Published by Reinhold Publishing Co., 430 Park Ave., New York 22, N. Y., 1957. 320 pages, $6.95.

Here is a good reference for persons entering the plastics field or thinking of using plastics. It discusses properties of commercial plastics, their costs, forms, applications, and methods of being processed. A feature of the book is a listing of 43 important plastics producers, along with their addresses, executives' names, products, trade names, and descriptions of their operations. Another valuable feature is a comprehensive listing of the various plastics' trade names, along with the chemical names for the product, and who makes it.

ENGINEERING DATA ON THREAD AND FORM ROLLING, Third Edition. Published by Reed Rolled Thread Die Co., Worcester, Mass., 1958. 88 pages, paperbound, $1.50.

The comprehensive technical data on thread and form rolling in this book should be of value to product design engineers, tool and method engineers, manufacturing and inspection departments, and those actively engaged in the application and use of the thread and form rolling process. Chapter topics in this enlarged edition range from a description of the processes to a discussion of rollability of various materials; equipment selection and blank specifications, to machine users' check lists.

ENGINEERING FORMULAS AND TABLES, No. 783. Published by Lefax Publishers, Ninth & Sansom Sts., Philadelphia 7, Pa., 396 pages, loose-leaf, $4.75.

Newly revised, concise, compact, and comprehensive, this handy pocket-size reference Lefax manual replaces heavy books of tables and formulas. It contains basic formulas, design data, and tables for three branches of engineering — mechanical, electrical, and civil. Sections include mathematics, measures, materials, gages and screws, mechanics, electricity and magnetism, hydraulics, structural data, and mathematical tables. All articles are in Lefax size, 6¾" x 3¾", and in loose leaf form.

THE SWISS AUTOMATIC. Published by Andre Bechler Ltd., and available from Bechler Service Corporation, 28 Harbor St., Stamford, Conn. 285 pages, $12.

Here is a very comprehensive, well-written, and well-prepared treatment of the Swiss Automatic lathe, designed as a guide to more successful automatic machining of high precision parts, using the Bechler methods of cam design and production. Numerous illustrations make it easy to follow the procedures and operations described in the book, and sketches point out important do's and don't's of Swiss Automatic operation. Starting with "first things first," the book gives the fundamentals of metal turning, then progresses to the function of the Automatic and examples of cam and tool layouts. It is a good book for training course use.

PROCEEDINGS OF THE FOURTH ANNUAL COMPUTER APPLICATIONS SYMPOSIUM. Published by Armour Research Foundation of Illinois Institute of Technology, 10 W. 35 St., Chicago 16, Ill., 1958. 126 pages, paperbound, $3.

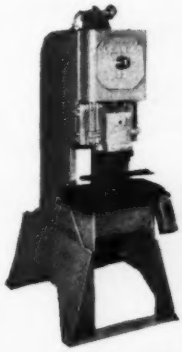
Applications of computer systems to inventory control problems, product development research calculations, and other record-keeping setups, as actually installed in various plants and offices, are included in this report of this year's computer symposium. The complete papers, presented by representatives of companies using computers, are included in the book.

TECHNICAL REPORT WRITING, by James W. Souther. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1958. 70 pages, $2.95.

This is a handy, practical book that shows how to use the engineering design approach in preparing technical reports. Step-by-step, the author shows how to analyze any particular writing situation: How to determine the purpose; how to formulate a plan of attack; how to gather the necessary material; how to decide what is to be included and in what order; how to write the report, check it, modify it, and prepare final copy. In addition to this, the useful appendices give a report writing check list, notes on abbreviations and other mechanics involved in report writing, data on reproduction processes, and a sample report to guide the writer.

It has the New Torc-Pac 22 Press Drive

WITH AIR FRICTION CLUTCH & BRAKE



The Clearing Torc-Pac 22 has the unique press drive shown in cutaway above. The complete operating mechanism from main motor to slide is combined into a compact package separate from the press frame. This offers flexibility and accessibility that will cut maintenance costs to the very minimum. The clutch in this remarkable press drive is a completely new wet disc design. You will find no other like it in the press industry. The friction discs are submerged in oil. Films of oil between the plates actually "pick up" or start the engagement. Result? The linings don't wear the way conventional linings would. You never have to adjust the clutch. You can operate for years without replacing linings.

More data on the Torc-Pac 22 with its unique clutch and brake and other features is yours for the asking. Write Clearing.

Also available in 32 & 45 ton capacities

CLEARING PRESSES

the way to efficient mass production

CLEARING MACHINE CORPORATION *division of* **U.S. INDUSTRIES, INC.**

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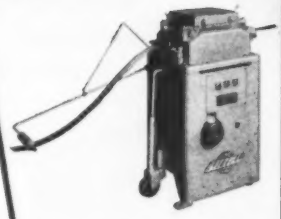
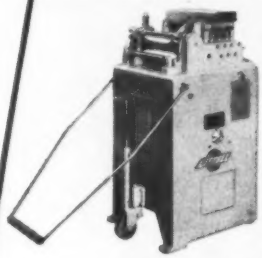
CIRCLE INFORM-A-GRAM KEY NO. 61

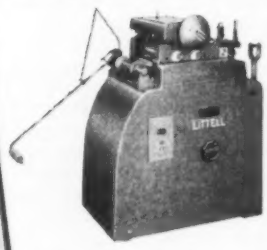
LITTELL STRAIGHTENERS



No. 208 STRAIGHTENER
For stock .010" to .040" thick and up to 8" wide. Also straightens stamped parts.



No. 308 STRAIGHTENER
For stock .018" to .065" thick and .018" to .050" thick, up to 12" wide.



No. 412-SPD STRAIGHTENER
For heavier stock from .040" to .125" thick by 12" wide.

FOR
AUTOMATED
COIL STOCK STRAIGHTENING AT ANY SPEED YOUR PRESS REQUIRES

STANDARD LITTELL STRAIGHTENERS with Variable Speed Drive straighten stock at any speed from 10 to 60 feet per minute. Proper slack in straightened stock between straightener rolls and press is automatically maintained by the Arm Control's up and down action which starts and stops the straightener motor.

ELECTRIC CLUTCH and BRAKE LITTELL STRAIGHTENERS provide for high speed intermittent straightening action with no motor stop. Ideal for hump feeding.

OIL GEAR DRIVE LITTELL STRAIGHTENERS have a straightening speed range of 0 to 60 feet per minute. Ideal for intermittent feeding of long stock lengths.

FAST DELIVERIES
from complete stocks in the newly enlarged Littell plant.

LOOK TO LITTELL FOR ROLL FEEDS • SHEETING LINES STRAIGHTENING AND FEEDING MACHINES REELS AND CRADLES FOR COIL STOCK

USE THIS COUPON
TO GET FREE CATALOGS.

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F. J. LITTELL MACHINE CO.
4197 N. Ravenswood Ave.
Chicago 13, Illinois
District Offices: Detroit, Cleveland

F. J. Littell Machine Co., 4197 Ravenswood, Chicago 13, Ill.
Send Littell Straightener Catalogs "C"

NAME _____
COMPANY _____
STREET _____
CITY _____ ZONE _____ STATE _____

5

CIRCLE INFORM-A-GRAM KEY NO. 62

A. Milne & Co., Inc. has made known the appointment of **Harry C. Cooper** as manager of the Milne tool steel warehouse and branch office in St. Louis.

◆

Assistant sales manager of the Springs and Formed Wire Dept. of the Wickwire Spencer Steel Division of The Colorado Fuel and Iron Corp. is **Kenneth J. Butler.** The general sales office in Palmer, Mass., will be his headquarters.

◆

The promotion of **Roy Perler,** Yale industrial truck salesman, to eastern regional sales manager of Yale Materials Handling Div'n, The Yale & Towne Mfg. Co., has been announced. Perler will have sales management responsibilities for Yale industrial truck sales in Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, Pennsylvania, Maryland, Delaware, Virginia, and eastern Canada.

◆

Carl Schonhoft has moved up from assistant manager to manager of grinding machine sales for Cincinnati Milling Machine Co. Manager of special machine tool sales is **Curtis Altbaier.**

◆

The advancement of **Walter H. Bertram** from manager of the Cleveland sales office to sales manager of Associated Spring Corporation's Raymond Mfg. Div'n, has been announced.

◆

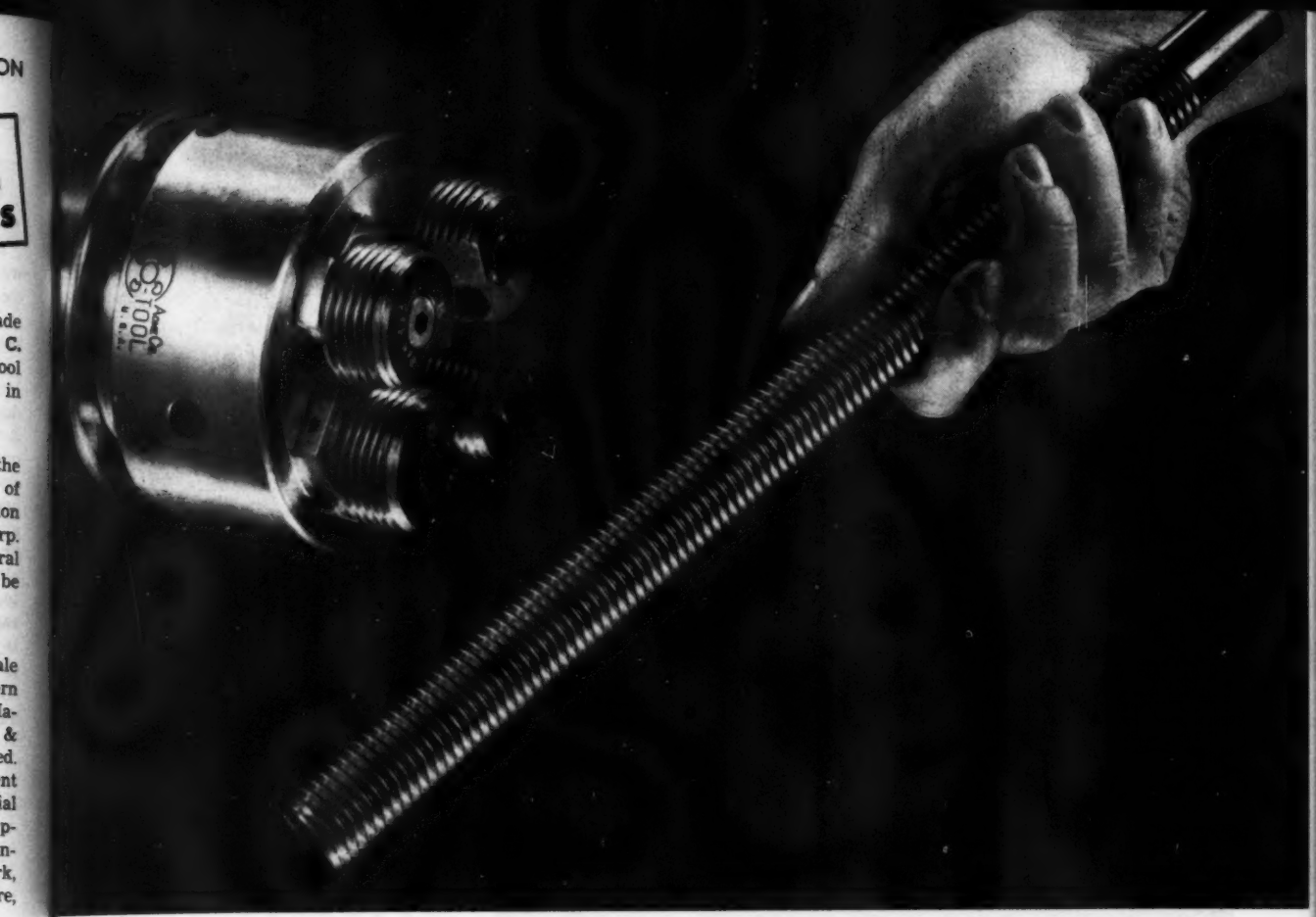
D. G. Watson is now serving as tool steel supervisor and **W. C. Baum** as stainless steel supervisor at the Indianapolis sales branch of Crucible Steel Company of America.

◆

A new sales office to serve the state of Michigan and the Toledo, Ohio, area has been opened by Miniature Precision Bearings, Inc. and will be directed by **Peter L. Weinert,** former sales engineer with the Chicago office.

◆

William R. Carlson has taken over new duties as Press Div'n district sales manager in the New York area for the E. W. Bliss Co. He succeeds **L. R. Hills** who retired recently.



VERS-O-TOOL cuts 10.3 miles of thread per grind on this job . . .

The Federal Screw Works had a real problem in threading. They had received a large order for 1"x13" adjusting screws. Using most thread cutting methods this would be a big, costly assignment.

Federal put a Namco 1⅝" DR Vers-o-Tool on the job and as a result, found they had to grind the chasers only once for approximately 2000 pieces. This means that each grind cuts well over 10 linear miles of thread. Threading cost per piece was amazingly low.

Remember, Vers-o-Tools can be used with your present turning equipment, lathes, drill presses or automatics. No investment in special machines required.

Find out how you can put Vers-o-Tools to work reducing your thread cutting costs. Write for a free copy of Booklet DT-52.

You can grind and regrind Vers-o-Tool circular chasers to a full 270° of the chaser circumference.

In addition to thread cutting, Vers-o-Tools may be used for end forming, end turning, chamfering, necking, knurling and burnishing

National Acme

THE NATIONAL ACME COMPANY, 169 E. 131st St., CLEVELAND 8, OHIO • Sales Offices: Newark 2, N. J., Chicago 6, Ill., Detroit 27, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 63

90FS **FLUTE GRINDER**

Automatic Universal

Grinds straight or spiral flutes from solid, including carbides, in tools such as:

- Drills as small as 1/16 inch dia.
- Spiral or straight taper reamers.
- Spiral or straight milling cutters and end mills.
- Sharpens saws up to 12 inch in diameter and in gangs up to 7¾" long.

AUTOMATIC INDEX FEED

Write for free Bulletin 90-FS

WARDWELL
3809 Ridge Road
Cleveland 9, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 641

Illustrated—New 9700 Series
Piggy Back Hydraulic Control Valve
Meets J.I.C. Standards

Look to Logan

the ultimate in hydraulic valve design

FREE SEND FOR THE "LOGAN CALCULATOR"

MEMBER: Natl. Mach. Tool Builders' Assn.; Natl. Fluid Power Assn.

LOGANSPORT MACHINE CO., INC.
844 CENTER AVENUE, LOGANSPORT, INDIANA

PLEASE SEND COPY OF CATALOG:

- ☐ 100-1 AIR CYLINDERS
- ☐ 100-2 MILL-TYPE AIR CYLS.
- ☐ 100-3 AIR-DRAULIC CYLS.
- ☐ 100-4 AIR VALVES
- ☐ 100-5 LOGANSQUARE CYLINDERS
- ☐ 100-6 ULTRAMATION CYLINDERS
- ☐ 200-2 PRESSES
- ☐ FACTS OF LIFE
- ☐ 200-1 HYD. POWER UNITS
- ☐ 200-2 ROTOCAST HYD. CYLINDERS
- ☐ 200-3 750 SERIES HYD. CYLINDERS
- ☐ 200-4 AND 200-7 HYD. VALVES
- ☐ 200-6 SUPER-MATIC CYLS.
- ☐ 300-1 CHUCKS
- ☐ ABC BOOKLET
- ☐ CIRCUIT RIDER

TO:
NAME _____ TITLE _____
COMPANY _____
ADDRESS _____

CIRCLE INFORM-A-GRAM KEY NO. 642

TOMCO INC.

HAND WHEELS Straight Type Offset Type

SPECIALS

- HAND KNOBS
- MACHINE HANDLES
- HANDLES
- BALL HANDLES
- LEVERS
- SPECIALTIES

GRADUATED DIALS

SPECIFY TOMCO FOR DEPENDABILITY

A Complete line of high grade hand knobs, levers, handles, hand wheels, graduated dials is available for immediate shipment from stock of standard items. Specialty items made to your specifications.

WRITE FOR INFORMATION

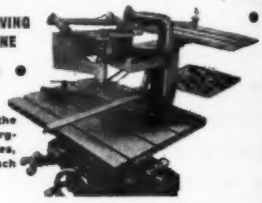
TOMCO INC.
1623 DOUGLAS AVE.
RACINE 2 WIS.

CIRCLE INFORM-A-GRAM KEY NO. 643

How to **ENGRAVE PANELS & SIGNS** *to 30" wide by any length*

Use the LOW COST precision built Preis-Panto 2D-4

ENGRAVING MACHINE



It does the work of larger machines, costing much more!

- Pantograph is graduated with reductions from 1:1 to 100:1 and will reduce to any size to infinity.
- Pantograph and Spindle link joints equipped with precision ball bearings throughout.
- Precision ball bearing cutter spindle.
- Collet capacity from 1/10" to 1/4" and standard taper shank cutters.
- Six spindle speeds—5,000 to 14,000 rpm.
- All feed-screw dials graduated in .001".

TRADE MARK PANTO

Write for complete details and prices. For immediate attention write directly to manufacturer below. Ask for nearest representative.

H. P. PREIS ENGRAVING MACHINE CO.
647 U.S. Route 22 Hillside, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 644

At Your SERVICE

All types of formed wheel grinding are offered by the **Gear Grinding Machine Co.** of Detroit. The service covers external and internal spur gears, splines and serrations, internal involute or V-shaped splines, external helical gears, and straight or oblique racks. The company also salvages grind gears that would otherwise be scrapped due to machining error or heat treat distortion. Special items which can be produced include master gears, spline gages, spline work arbors, and plug gages.

•

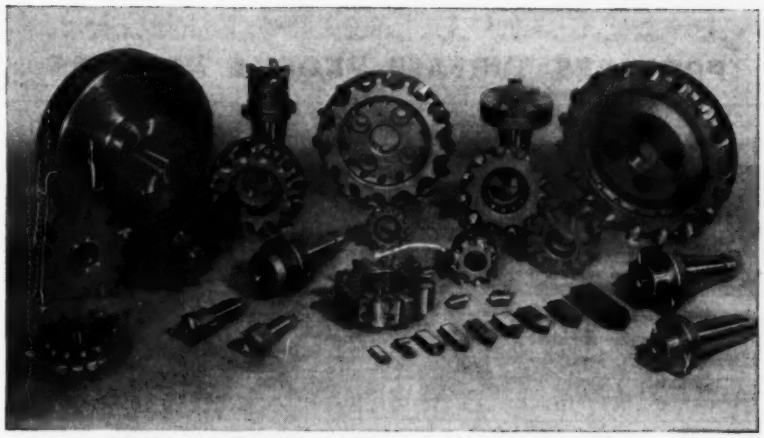
Precision metallurgical services are available from the **Precision Metals Div'n of Hamilton Watch Co.** The processes done at the plant include vacuum and air melting, forging, hot and cold rolling, slitting, wire drawing and swaging, and vacuum and atmosphere heat treating. Metallurgical, chemical, and physics laboratories are also available.

•

Reduce tap cost by completely reconditioning them using the services of **Pioneer Tool Crib, Inc.** The process includes the following steps: The visual examination to determine suitability for reconditioning; removal of worn, loaded, or damaged threads; refinishing of straight flutes to obtain clean cutting faces and to improve the surface finish; and grinding precision chamfer with uniform height of cutting edges and proper amount of relief. Other services include measuring pitch diameters and rebuilding to original size by hard chrome plating. Also available is a lubricating deposit which is said to improve tap performance in some types of materials.

•

Dayton Rogers Mfg. Co. is offering a production sample incorporating many of the conditions common to parts fabrication. Produced by short-run methods using temporary tools, the sample shows typical mechanical problems met with in terms of material type, temper, and thickness. Bulletin DSS-2, available from Dayton Rogers Mfg. Co., 2824 13th St., Minneapolis 7, gives information to help buyers of small lot stampings.



Milling Cutters — End Mills — Blades — Boring Tools —Arbors — Flywheels

These Lovejoy Products can help you Cut Costs!

The entire line of Lovejoy Milling Cutters and Accessories is designed to aid you in getting better production at less cost.

If you are not now using Lovejoy products, we invite you to do so at first opportunity.

Lovejoy precision-engineered tools include:

Inserted-tooth milling cutters (face, side, end, slotting and boring) which feature husky, forged steel housings; exclusive Lovejoy "positive-locking" blade assembly; a variety of dozens of models and hundreds of sizes.

Blades: H.S.S., Vasco Supreme and carbide. These are interchangeable over a wide range of housing sizes, and Type "A" face milling blades will fit any standard Lovejoy Type "A" cutter of 4½" to 24" dia. All Lovejoy blades are carried in stock, ready for immediate shipment. Special cutters are a Lovejoy specialty.

PERFORMANCE REPORT

A Type H "SHEARJOY" cutter (with 35° lead angle) was used recently to reduce a 11,070 lb. casting to 3400 lbs. The cutter ran 18 straight hours without regrinding. Cutter condition after using was excellent. Owner's comment: "This is the cutter I've been looking for for a long time . . . if we had this cutter 10 years ago, we would have saved $50,000 . . . it's the most impressive cutter I have ever seen."

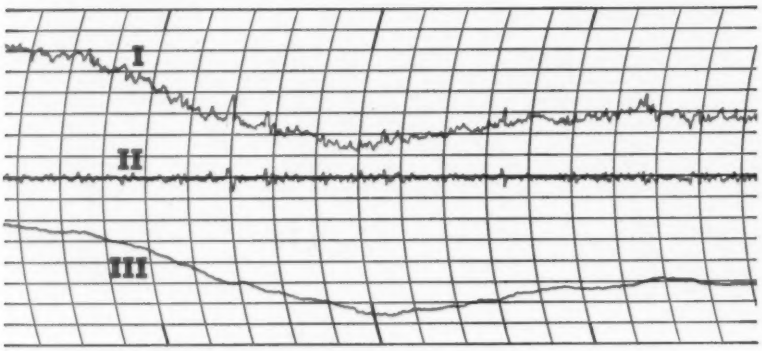
Catalogs — include: "Face Mill" Catalog No. 31; Side Mill Catalog No. 32; Type "S" Bulletin; Arbor Catalog No. 33; "Speed and Feed" Calculator. Write today for copies desired.

LOVEJOY TOOL COMPANY, INC.
Springfield, Vermont, U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 65

PROFICORDER®

PROVIDES SURFACE PROFILE RECORDS

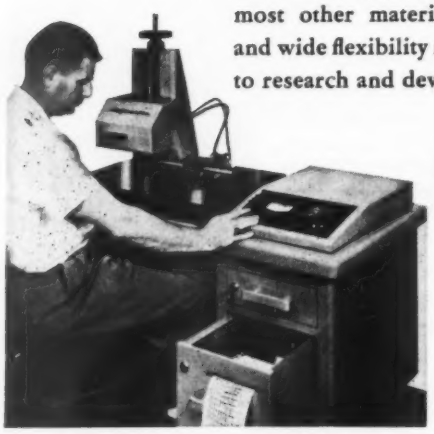


Three Proficorder records of same portion of a surface, reproduced ½ size, showing (I) total profile, (II) roughness profile, and (III) waviness profile. Note range of detail.

THE PROFICORDER draws a magnified profile of machined and finished surfaces, showing the *height, width* and *relative position* of the surface irregularities. It clearly shows any desired detail from over-all contour to fine roughness. Accordingly —

These charts permit detailed study and comparison of waviness . . . roughness . . . porosity . . . flaws . . . wear . . . and the effects of finishing processes.

The Proficorder will show (I) the total profile, (II) roughness alone, or (III) waviness, steps and other widely-spaced irregularities with roughness omitted. It is used on metals, paper, plastics, ceramics, and most other materials. Ease of operation and wide flexibility make it especially suited to research and development work.



FREE
BULLETIN LT24
gives details. Write for it! And let us furnish you with profile charts of surfaces in which you are interested.

Proficorder is a registered trade-mark.

Made by the Profilometer® people —

MMC®
MICROMETRICAL MANUFACTURING CO.
339 S. MAIN ST. ANN ARBOR, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 66

MEN YOU SHOULD KNOW

Three appointments of the staff of the missile section of the Products Division of Bendix Aviation Corp. have been made known. **D. M. Heller** and **R. E. Whiffen** have been appointed assistant general managers, and **W. P. Bollinger** has been named director of engineering.

George N. Malcolm is serving as general manager of Ward LaFrance Truck Corp., a subsidiary of Glen Alden Corp. He succeeds **F. N. Tracy**, president, who resigned.

The directors of Bohn Aluminum & Brass Corp. elected **Guy H. Pitts** vice president of manufacturing.

Former controller **J. J. Schofield** has been elected a vice president of the Detroit Harvester Co.

C. Allan Brady has taken over as general manager of the Missile Division of Chrysler Corp. This division will be responsible for the corporation's participation in development, engineering, and production in the Redstone and Jupiter programs.

Appointment of **Thomas H. Pike, Jr.** and **John E. Chumbley** as division vice presidents and **F. E. MacDonald** as controller, was announced by Tube Turns, a division of National Cylinder Gas Co. Pike will be in charge of planning and Chumbley will be in charge of general sales operations for the division.

Appointment of **Paul M. Tunison** as director of engineering at Judson L. Thomson Mfg. Co. has been made known by the company. Tunison will be responsible for tool and machine design, plant design, layout, methods, and procedures.

Arthur J. Welch has taken over as vice president and general manager of the Spring Div'n of Borg-Warner Corp. He was formerly vice president and assistant general manager.

Harold Wrigley has been transferred from the Boston office to become executive vice president of the Vlier Engineering Div'n of Barry Controls Co.

The board of directors of Woodruff & Edwards, Inc. elected **Richard W. Hampel** vice president of the Machine Div'n. He was formerly superintendent of the Machine Div'n.

Appointment of **Elmer J. Lell** as vice president in charge of Colmonoy Div'n operations has been made known by Wall Colmonoy Corp. He formerly served as sales manager and vice president.

William H. Ducker is the president of a newly-formed company, The Ducker-Singer Co., which offers a scientific engineering consultant service and produces a range of automatic materials handling equipment.

New plant engineer at the Coraopolis plant of Russell, Burdsall & Ward Bolt and Nut Co. is **Clifford A. Mikus.**

Allied Products Corp. announces the following management changes: Vice president **W. Curtis Miller** becomes general manager of the Richard Bros. die, prototype, and pressed metals activities in addition to his duties as plant manager of Plant 4; vice president **Walter S. Jakubowski** is in charge of sales, engineering, and estimating for all hard die operations at Plants 2, 4, and 7; and Henry Ebel is manager of Plant 2.

Appointment of **H. F. Froehlich** as group manager responsible for the manufacturing, engineering, and purchasing-production control departments has been made known by Sherman Products, Inc. He was formerly manager of purchasing and production control.

Harlan M. Thorpe has been appointed manager of quality control in General Electric Company's Medium Steam Turbine, Generator, and Gear Department.

Newly-appointed plant superintendent at Elmes Engineering Div'n and King Machine Tool Div'n of American Steel Foundries is **Frank O. Sorensen, Jr.**

Newly elected president and genral manager of Landis Machine Co. is **G. M. Stickel,** who formerly served as vice president and general manager. **J. H. Elliott,** past president, was appointed chairman of the board and vice president. Other changes include **R. E. Yingling,** director of sales; **D. Roy Stoner, Jr.,** domestic sales manager; **A. R. Margin,** assistant export manager; **L. M. Hess,** treasurer and assistant controller; **L. H. Randolph,** works manager, Main Plant; **F. Nell,** works manager, Tap Division; and **R. I. Eyler,** plant engineer.

consult the.... Roto-Finish CUSTOMER'S MAN

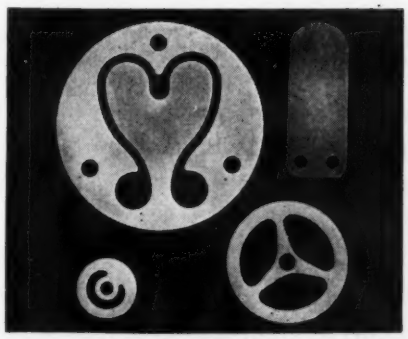
FOR FINISHING PLUS+

RESEARCH AND TECHNICAL ASSISTANCE

Faced with the problem of cutting down finishing costs with no sacrifice in product quality, more and more production and management men are turning to Roto-Finish for complete finishing *service*.

In the Roto-Finish Laboratory, technicians analyze your problem to determine the process which provides the desired finish at minimum cost. Often, it is necessary *to develop a new compound* to meet a specific need.

Test runs are then made in the Roto-Finish Processing Department under production conditions. If desired, your local Roto-Finish Customer's Man will run these tests in your own plant; so that you can check the results at first hand, results like this...



Roto-Finish CASE HISTORY

PART: Refrigeration compressor flapper valves. • MATERIAL: Swedish steel. OPERATIONS PERFORMED: Deburr. Generate full radii on all edges. Remove stress risers. • RESULT: Fatigue resistance increased 500%.

ROTO FINISH®

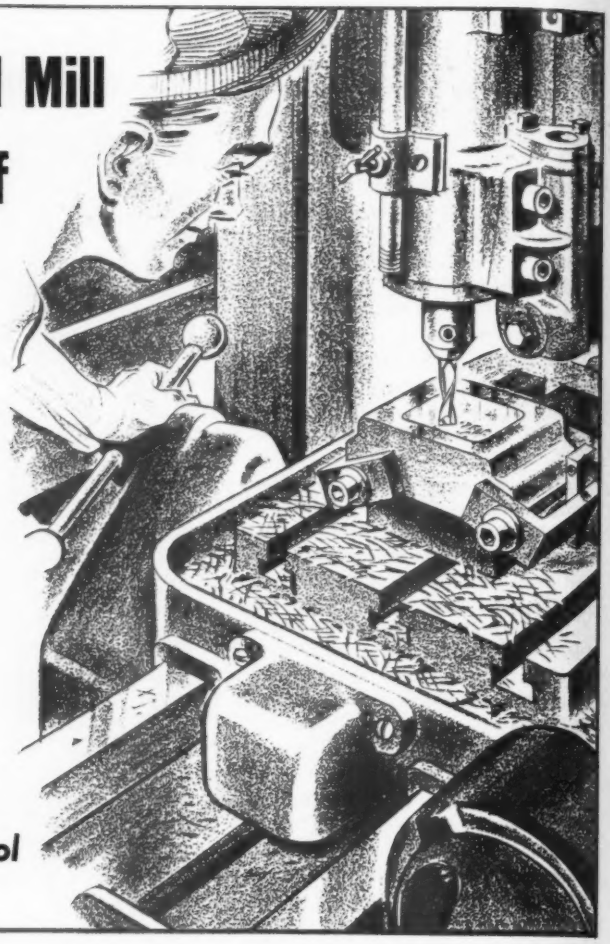
Roto-Finish COMPANY

3729 MILHAM ROAD
KALAMAZOO, MICHIGAN
Phone: Fireside 3-5578

FOREIGN REPRESENTATIVES: ARGENTINA—Taller—Buenos Aires • AUSTRALIA—A. Flavell Ltd.—Cheltenham • BRAZIL—Commercial E. Industrial de Fornos Werco, Ltd.—Rio de Janeiro • CANADA—Canadian Hanson & Van Winkle Co., Ltd.—Toronto • ENGLAND—Roto-Finish Ltd.—Hemel Hempstead • FRANCE—Societe Roto-Finish—Paris • GERMANY, AUSTRIA, NORWAY, SWEDEN, SWITZERLAND—Metallgesellschaft A. G.—Frankfurt, a. M.—Germany • HOLLAND, BELGIUM, LUXEMBURG—N. V. Roto Finish Maatschappij—Delft, Holland • ITALY—Societa Roto-Finish a R. L.—Milan • SPAIN—Instituto Electroquimico, S. A.—Barcelona

CIRCLE INFORM-A-GRAM KEY NO. 67

2-Flute CLEVELAND End Mill Solves Problem of DEEP CAVITY MILLING



Rough and Finish Milling now performed with a Single Tool

A midwest manufacturer was production milling a deep cavity in steel forgings. The cavity required ¼″ corner radii, but because of the deflection and "whip" encountered in the ½″ diameter end mills he was using, it was necessary to rough mill the cavity with a 1″ diameter end mill and then finish mill with a ½″ diameter 4-fluted end mill.

By changing to a ½″ diameter CLEVELAND Long Flute End Mill, as shown above, he was able to rough and finish mill this cavity *with a single tool.* The correct combination of rigidity, rake angle, relief angle and flute shape have been built into this latest addition to the CLEVELAND End Mill Line to enable the user to obtain maximum rates of metal removal with minimum deflection and cutting edge wear, and the virtual elimination of breakage.

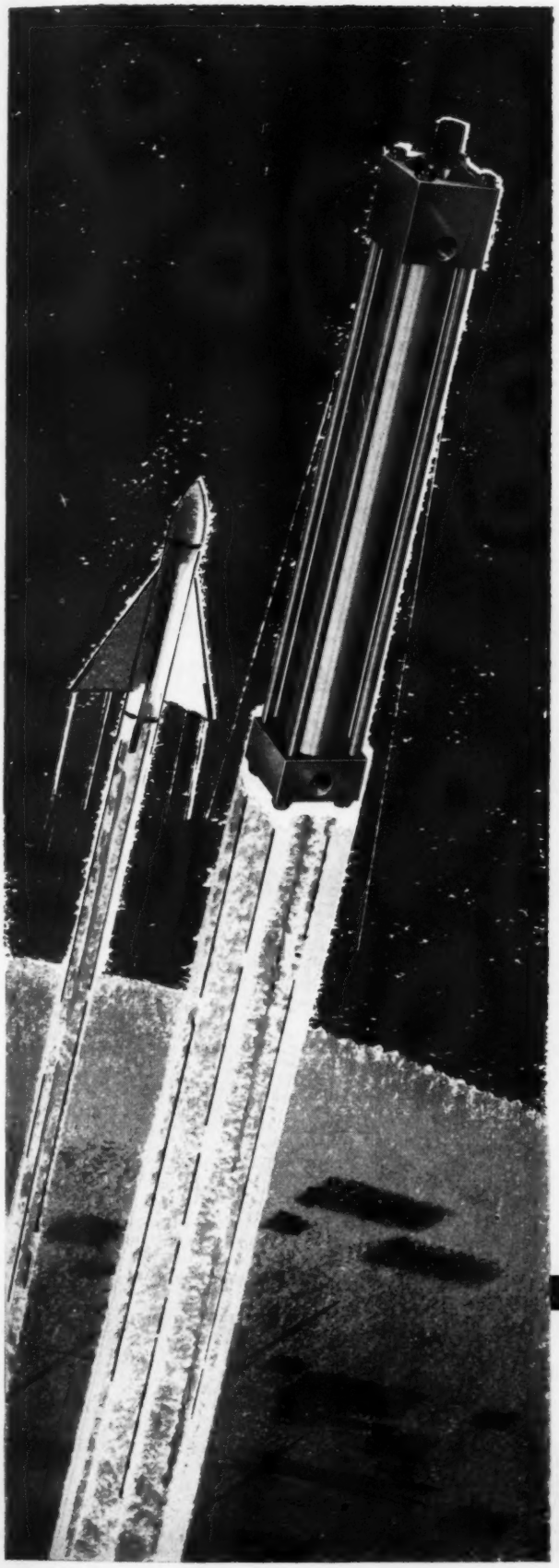
TELEPHONE YOUR INDUSTRIAL SUPPLY DISTRIBUTOR

THE CLEVELAND TWIST DRILL CO.

1242 East 49th Street • Cleveland 14, Ohio

Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 2 • San Francisco 5 • Los Angeles 58 • E. P. Barrus, Ltd. London W. 3, England

CIRCLE INFORM-A-GRAM KEY NO. 68



ORTMAN-MILLER Launches Another Star Performer... The O-M Automation

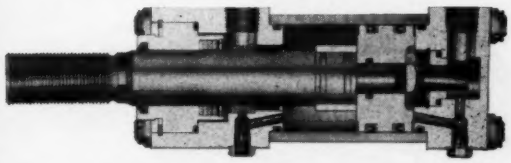
Heavy-Duty Air and Hydraulic Cylinders

1000 PSI Hydraulic — Series RH

200 PSI Air — Series RA

available in 1½" to 8" bores

Meets JIC and Automotive Industry "Automation Standards"



Any resemblance between a guided missile and an O-M AUTOMATION cylinder is purely coincidental. However, each stands as a symbol of progress in its own field.

In the Series RA and RH air and hydraulic cylinders O-M has incorporated many advanced features in an extremely rugged line of cylinders designed to meet automotive industry specifications for Automation cylinders. The advanced design of these cylinders makes them well suited for severe applications in all types of machinery and equipment.

For detailed information, consult your local O-M representative or see our new catalogues No. 107 for Air Cylinders— No. 108 for Hydraulic Cylinders.

Mail coupon below for your copy!

ORTMAN-MILLER MACHINE COMPANY

21 143rd Street, Hammond, Indiana

☐ Have representative call
☐ Send Bulletins 107 and 108

Name_____ Position_____

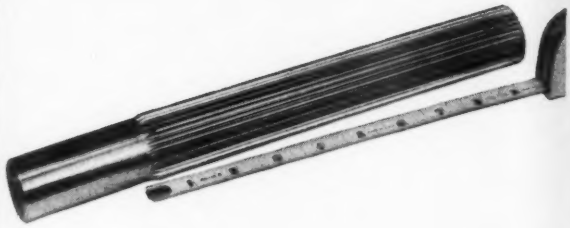
Company_____

Address_____

City_____ Zone____ State_____

CIRCLE INFORM-A-GRAM KEY NO. 69

Tubular parts—*On even thin-walled tubes from ½ to 2-inches OD, splines and serrations can now be quickly and inexpensively Roto-Flo cold formed.*



Long splines—*can now be cold rolled on solid as well as tubular parts. 30° or 45° PA tooth forms can be made with this low-pressure method and axially fed parts.*

Announcing a NEW ROTO-FLO METHOD

Now the **ROTO-FLO** chipless process that cold forms toothed parts faster at lower cost is extended to a broader range of parts. The development complements present Roto-Flo equipment.
Write for details!

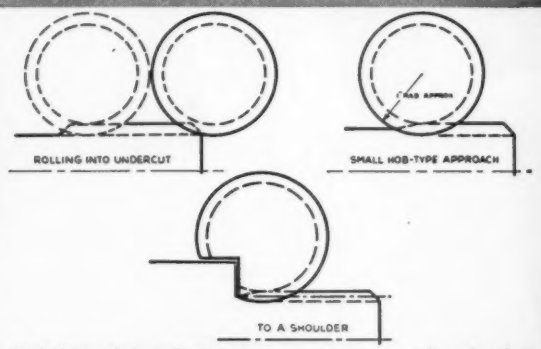
–for spline rolling tubular parts

–for splines of any length

–with versatile lower cost tooling

–economical for shorter runs

Lower-cost tooling—*Cylindrical forming racks reciprocate in opposed directions while a part is fed in axially. Racks are indexable to several settings for long life and lower tool inventories. No regrind costs are involved with these throwaway forming inserts.*



All kinds of parts—*are inexpensively splined or serrated with this versatile new Roto-Flo method. Notched racks can form full-depth teeth within ¼ inch of a shoulder. Parts having the same pitch diameter can be rolled with the same rack.*

May we have the Roto-Flo field engineer in your area show you how this new method can make your parts better.

MICHIGAN TOOL Company
from blank to finished gear

7171 E. McNICHOLS RD., DETROIT 12, MICH., U.S.A.
IN CANADA: COLONIAL TOOL CO. LTD.

CIRCLE INFORM-A-GRAM KEY NO. 70

PUBLICATION PREVIEWS

CATALOGS • BULLETINS • SPECIFICATIONS

Circle Inform-A-Gram key number on postage-free Reader Service Card for your request.

Rigid Construction, strong, accurate threads, and long life precision rolls, and interchangeable helix angle bushings are features of the No. 5 thread rolling heads, which are

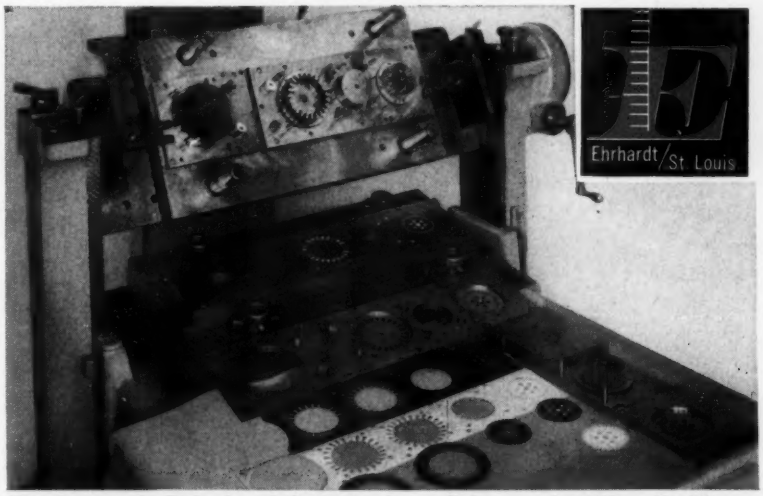
especially good for high speed operations. Also discussed in a bulletin are sizes available, size adjustment, and their self-opening operation. Contact Landis Machine Co., Waynesboro, Pa., for a copy of Bulletin F-99, or —
Circle Inform-A-Gram Key No. B1.

"The New Economics of Press Automation" explains the how and why of automation and gives the answers to the three basic problems of today's press work. The topics considered are single purpose equipment, retooling time, and obsoles-

cence of equipment. Suggestions are given for different production problems, including what machine and type of automation would do the best job. Write Clearing Machine Corp., Div'n of U. S. Industries, Inc., 6499 W. 65th St., Chicago 38, or —
Circle Inform-A-Gram Key No. B2.

Over 75 Footswitches of different types and covering every footswitch need are included in a catalog. Specifications for each switch include contact type, stage, pole, throw, phase, rating, size, weight, and specific features. Linemaster Switch Corp., 432 Woodstock Terrace, Woodstock, Conn., supplies copies of the catalog, or — **Circle No. B3.**

Get Non-Restrictive Hand and Finger Protection without sacrifice of speed and efficient feeding operations using a Sentry Guard on presses. This device can be adapted to an air-driven or a drill press. Operational steps are pictured in a bulletin available from Searjeant Metal Products, Inc., 37 Pittsford Rd., Mendon, N. Y., or — **Circle No. B4.**



This change in the Ehrhardt-made lamination die, cradled in one of our Moore Die Flippers, embodies 700 hours of precision tooling compressed into 4 weeks to meet delivery date. Of high-carbon, high-chrome steel, held to tolerances of 0.0002", this die is designed to produce two types of complete rotors in the stages pictured above.

This is Ehrhardt precision-under-pressure ...duplicated...with no lost accuracy

If you think you're seeing double—you are! Using this interchangeable Ehrhardt/St. Louis die, our customer can mass-produce one kind of complete rotor, then change over easily to mass-produce another type, for motors with a different rating.

Precision of the order required originally in this double-duty die—to tolerances of 0.0002"—is not considered remarkable at Ehrhardt. This die was ready for delivery when the customer was offered an order for motors of the same size stator, but an entirely different design on the rotor—changing from the key hole slot to the tear drop slot—provided he could meet a 4 week delivery date.

This required *extra* interchangeable parts, including new die block, new segments, new stripper, together with punches and punch pads—virtually a whole new die in high-carbon, high-chrome steel. Because we accomplished this *in limited time*, we enjoy sharing with you our satisfaction in a job well done.

When you need precision in a hurry, Ehrhardt stands ready—aided by such up-to-the-minute facilities as Elox electrical discharge machining and latest Moore hole-location machines.

Send for the free booklet triple plus. Learn how this Ehrhardt concept—full-range facilities, precision skills, unique experience—can mean profit-from-precision for you.

EHRHARDT TOOL & MACHINE CO., 914 Monroe Street, St. Louis 6, Mo. Telephone: CEntral 1-5350

A nation-wide service to the few who want the most in high precision gages, dies, jigs and fixtures
CIRCLE INFORM-A-GRAM KEY NO. 71

as NEW *as* TOMORROW...

VALVAIR plug-in valves cut assembly and maintenance costs!

Model PA-121

Built-in plugs and connectors in Valvair's new ¼ in. Speed King 4-way control valves complete electrical circuits *automatically* . . . reduce assembly and maintenance time to a cost-cutting minimum! Permanent electrical connections are made in manifold or sub-base at assembly . . . then valves and pilots are plugged in . . . bolted down. There's no need to disturb equipment wiring for quick in-service maintenance!

Navy M bronze and stainless steel components assure 20 million cycle-plus dependability. Interchangeable pilot, with coil guaranteed against burn-out for life of valve, fits any plug-in Speed King. Coils for ac or dc, any voltage . . . 35—200 psi range . . . optional manual over-ride . . . ¼ in. cylinder ports . . . 2 or 3 station manifold with common inlet, exhaust and conduit ports, or sub-base mounted . . . valve meets JIC standards!

Whether you build or operate machines, you'll find that Valvair plug-in control valves set new standards of adaptability, performance and economy! Valvair Corp., 454 Morgan Ave., Akron, Ohio.

RESEARCH...
PROGRESS...
LEADERSHIP...

AA-6639

Representatives in principal cities.

High Speed Cutting Tools are featured in a catalog from Fastcut Tool Co., 7405 E. Davison, Detroit 12. N-Mills, counterbores, and chucking reamers are produced up to ¾" dia.

Keyseat cutters, combined drills and countersinks, center reamers, and special tools are also described. Write the company for a copy of this catalog, or — **Circle No. B5.**

A New Single Component Epoxy-Adhesive Preform used in automatic or production joining, sealing, or encapsulating of metals or ceramics is described in a bulletin. Data on curing temperatures, time cycles, sizes and shapes available, clearances necessary, and suggested applications are included. Copies of Bulletin 114 are available from Duramic Products, Inc., 262-72 Mott St., New York 12, or — **Circle No. B6.**

Cut Manufacturing Costs using the Landis cylindrical grinder rebuilding program to increase production, improve accuracy, and lessen setup time of old Landis machines. A bulletin shows the step-by-step process followed to give the machine "original" accuracy and production. Write Landis Machine Tool Co., Waynesboro, Pa., for this bulletin, or — **Circle Inform-A-Gram No. B7.**

Stop Rust and Rust Creepage with the Z.R.C., Zinc Rich Coating, detailed in a bulletin. When applied by brush or spray to iron or steel it provides a tough, adherent, flexible coating. Application data is included in the bulletin published by The Sealube Co., Wakefield, Mass., or — **B8.**

The Pushbutton Plate and Sheet Handler for use with floor or cab-operated cranes attaches, lifts, transports, and detaches without manual handling at the touch of a button. Features of this system are given in this bulletin, available from Noble Co., Automation Div'n, Box 1979, Oakland 4, Calif., or — **Circle No. B9.**

Protect Machine Parts with the Gortite sleeves, boots, way-protectors and machinery covers described in a bulletin. They come in round, square, rectangular, and combination shapes to operate in angular, horizontal, or vertical positions. Write to the A & A Mfg. Co., Inc., 712 S. 12 St., Milwaukee 4, for a copy of Bulletin SPC-3, or — **Circle No. B10.**

Electroforged Steel Grating is one of the products discussed in a booklet which includes drawings of the types and spacings of other available grating. Dimensions for interlocked, riveted, U-type, diagonal, heavy-duty, or T-bar grating are included. Write to Blaw-Knox Co., 300 6th Ave., Pittsburgh 22, for a copy of Catalog 14R, or — **No. B11.**

Capacity and Mobility for Handling 55 Gal Drums between floor level and a height of 57" is one of the features of the Type DLK Shoplifter described in a bulletin. Complete specifications and safety features are included. Direct requests for copies of Bulletin DLK-305 to Economy Engineering Co., 4501-4523 W. Lake St., Chicago 24, or — **B12.**

If your feeling the PINCH...
For want of a PUNCH...
Talk to the people at
3P
It's a fast service company, stuffed with personnel who know that "DOWN-TIME" is "LOST-TIME". Distributors in principle cities assure IMMEDIATE DELIVERY from over 37,000 sizes in stock.
You get the finest quality in 3P HEAD PUNCHES and DIE BUTTONS, because they are made from 3 types of the finest tool steel, and are available in any DECIMAL size.
NEVER FEEL THE PINCH!
GET 3P PUNCHES AND DIE BUTTONS WHEN YOU NEED THEM.
*Reg.
"Still the best performer"
Porter Precision Products also make BAL-LOK* Punches and Die Buttons. They're always in stock and ready for IMMEDIATE DELIVERY too. Any DECIMAL size.
NO EXTRA CHARGE FOR FAST SERVICE
HIGH QUALITY, OR ODD SIZES.
PORTER PRECISION PRODUCTS
PRinceton 1-6338 • P.O.Box 208 • Cincinnati 15, Ohio
CIRCLE INFORM-A-GRAM KEY NO. 73

Sharpening Machines described in a catalog will sharpen all band saws, and non-ferrous metal cutting saws. Information on the use and advantages of each unit and detailed specifications are included. Write to Black Diamond Saw & Machine Works, 129 North Ave., Natick, Mass., for a copy of the sharpening equipment catalog, or — **Circle No. B13.**

For Accurate, Efficient Milling and Grinding of a number of pieces at the same time, use the Model GF-2 gang fixture. The compensating jaws clamp each individual workpiece with equal pressure, even though the pieces may vary in size by as much as $\frac{1}{32}$". The fixture can be adapted for either air or hydraulic locking. Specifications are given in a bulletin from Lassy Tool Co., Plainville, Conn., or — **Circle No. B14.**

Industrial Gas Burners, furnaces, and accessories for heat treating, metal melting, soldering, and drying are discussed in a catalog. Described is the full Hones line, including sections on special furnaces and manual and automatic controls. Catalog 1570 is prepared by Charles A. Hones, Inc., 2463 Grand Ave., Baldwin, L. I., N. Y., or — **Circle No. B15.**

57 15

Ever see a broach this large before?

This mammoth broach accurately broaches involute splines in steel for a builder of earth-moving equipment. Built by Ex-Cell-O's Continental Tool Works Division, it called for a series of critical manufacturing operations, including a difficult hardening process applied to the shell main body . . . another good example why it pays to call in your local Ex-Cell-O Representative when you face an unusual broaching problem.

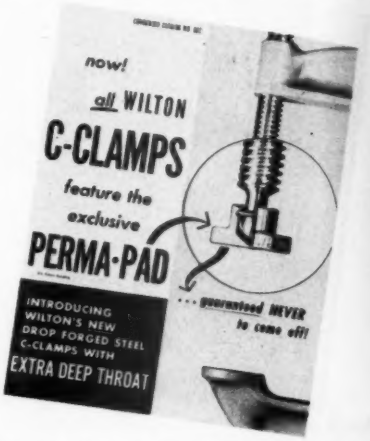
Just one of the many other types of broaches built by Continental.

Continental CTW TOOL WORKS

Division of Ex-Cell-O Corporation
DETROIT 32, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 74

C-Clamps with Perma-Pad Swivel Pads, guaranteed never to come off, are covered in a new catalog. Also shown in the catalog is the redesigned Rapid Titan quick-acting C-Clamp and the new series of drop



forged steel clamps with extra-deep throat. Wilton Tool Mfg. Co., Inc., Schiller Park, Ill., supplies copies of Catalog 692, or — **Circle No. B16.**

Reduce Retooling Time and Costs using Roll-Bond sandwich-type metal which gives tubing wherever wanted in a sheet. Examples of the advantages material and the step-by-step procedure used in the creation of a Roll-Bond product are described. Write to Roll-Bond Products, Western Brass Mills Div'n, Olin Mathieson Chemical Corp., E. Alton, Ill., for copies of the bulletin, or — **No. B17.**

"Cylindrical Grinding Machine and Lathe Centers" is the title of a bulletin which describes a line of Red-E centers and grinder dogs. Information on anti-friction Superaccurate

and anti-friction bull and pipe grinder centers, high speed steel and carbide tipped centers is included. Ready Tool Co., 150 Garfield Ave., Stratford, Conn., supplies copies of Catalog CD-58, or — **Circle No. B18.**

"HILLCO" TANGENT CHASERS

The new line of "HILLCO" Tangent Chasers, which can be re-ground for 80% of their original length, are guaranteed to be of highest grade tool steels ground to exacting tolerances. We feel that this complete line of chasers are the finest that we have produced in our 75 years of cutting tool manufacture. We think that you will agree with us.

THE HILL ACME COMPANY
ACME MACHINERY DIVISION
1203 West 65th Street • Cleveland 2, Ohio
CIRCLE INFORM-A-GRAM KEY NO. 751

ALL AMERICAN FOR PRECISION FILING

An exclusive Ball and socket file clamp and file setting square assure true vertical filing position regardless of distortion in file shank. Hand finishing entirely eliminated.

ALSO SAWS AND HONES

Attachments permit accurate sawing and honing with infinite speeds from 170 to 470 strokes per minute. Table can be tilted 15° front and back.

Reasonably priced, the All American will quickly pay for itself in any tool and die shop. Write for catalog, price and name of nearest dealer.

ALL AMERICAN
TOOL & MFG. CO.
(Not Inc.)

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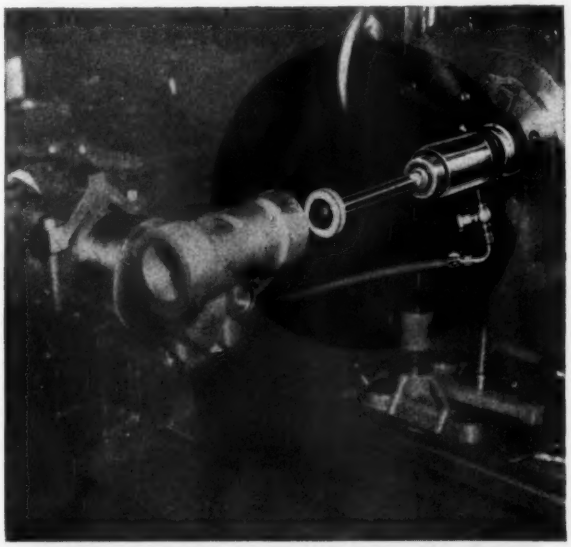
(Chicago Suburb)

CIRCLE INFORM-A-GRAM KEY NO. 752

HOLES JIG GROUND with Vulcanaire



SPECIAL VULCANAIRE ON A BORING MILL

Micro-finish and accuracy required on this large part. Vulcanaire 20,000 Series, with special grinding spindle, ground the hole to specifications. By controlling speed at ANY point you eliminate need for a variety of types and kinds of constant speed spindles.

Provide yourself with this inexpensive instrument for use on your present equipment and JIG GRIND with a guarantee.

{ Borrow our instructive 11 minute movie on Jig Grinding. }

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ENGINEERING • PROCESSING • BUILDING • TOOLS
DIES • SPECIAL MACHINES • VULCANAIRE JIG GRINDERS • MORTORIZED ROTARY TABLES • BREHM "SHIMMY" AND RELATED DIES • AUTOMATION

Vulcan's 41st Year

VULCAN TOOL COMPANY
741 Lorain Ave., Dayton 10, Ohio

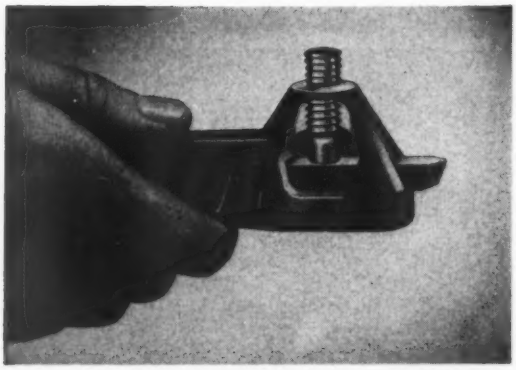
VULCAN tools

CIRCLE INFORM-A-GRAM KEY NO. 753

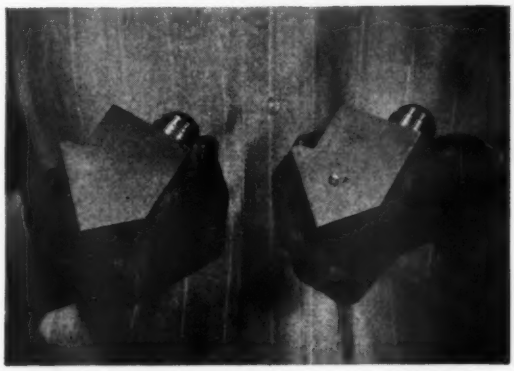
Practical Tooling Tips

Number 1 of a series.

Everyday more and more shops are using standard Vlier Tooling Accessories in place of custom-made devices for both tooling and original equipment applications. The precision construction, product uniformity and quick availability of these simple time-savers have made them tool room favorites. Why don't you start saving from their use?



TO GET GREATER TOOL BIT RIGIDITY replace the tool holder screw with a Vlier Swivel-Pad© Clamp. The large, flat pad face provides many times more clamping area. Bits can be held tighter, reducing chatter and vibration. Small, narrow cut-off blades, multipoint tools, even stub ends can be rigidly held. Unique ball joint construction gives smooth angle adjustment in all directions.

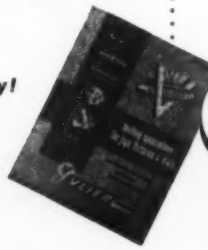


EASY WAY TO STOP MARRING surface of part held in fixture. The part on the left was securely held in the fixture with a Vlier Swivel-Pad© Clamp. The scrapped part on the right was held with an ordinary set screw. With the Vlier Swivel-Pad© Clamp the pad stops at first contact with the part; screw torque is absorbed by a ball, preventing damage to the part. This exclusive ball joint construction also provides adjustment to off-angle surfaces.

SPRING PLUNGERS LET WRENCH DO MULTIPLE DUTY—The compression tool shown above is used to attach connectors to electrical wires. Formerly, each size wire connector required a different size tool. But now, through the use of Vlier Spring Plungers, one tool attaches all sizes of connectors—through the use of changeable jaws. The appropriate jaw for any size connector is easily inserted, accurately positioned, and held in place with a Vlier Spring Plunger.

THE RIGHT AMOUNT OF END PRESSURE AND NO MORE is what this spring plunger application calls for. More than 150 Vlier Spring Plungers are used to hold a plastic sheet in position during the forming operation of a plastic refrigerator door liner. Spring Plungers provide just the right amount of pressure to produce a perfect liner.

New catalog now ready! Send for your copy today.



Insist on Vlier Tooling Specialties... there's still no substitute for quality.

VLIER ENGINEERING CORPORATION

8900 Santa Monica Blvd., Los Angeles 46, California
A Subsidiary of Barry Controls, Inc.

CIRCLE INFORM-A-GRAM KEY NO. 76

Industrial Hose Application, Selection, and Mounting is one of the featured sections in a 32-page catalog from J. N. Fauver Co., Inc., 51 W. Hancock, Detroit 2. Specifications are given for assemblies, couplings, stems, swivels, and accessories. For your copy of Catalog 57, write to the company, or — **Circle No. B19.**

Use Vibratory Lapping Machines for mechanical polishing of metallurgical samples for microscopic examination, or lapping of metallic sealing ring bases and other metal parts for mating purposes. A bulletin describes the features of these machines and gives possible applications. Contact Syntron Co., 341 Lexington Ave., Homer City, Pa., for your copy, or — **Circle No. B20.**

High Speed Air Tools come in three models for finer, faster burring, sanding, grinding, and polishing. A bulletin describes how these tools can be used on a wide range of work from extremely delicate operations to finishing of large castings in both carbide and high speed steel. Pratt & Whitney Co., Inc., Charter Oak Blvd., W. Hartford 1, Conn., will supply copies of Circular 616, or — **Circle Inform-A-Gram No. B21.**

Abrasive Cutoff Wheels are described in a bulletin which gives the characteristics of the three available bond types: resinoid, rubber, and reinforced resinoid. A section points out good cutoff practices and a table of suggested gradings for cutoff operations is also included. Write Cincinnati Milling Products Div'n, Cincinnati Milling Machine Co., Cincinnati 9, for copies of Booklet PG-336, or — **Circle No. B22.**

Bench Hand Metal Punches are outlined in a bulletin which gives dimensions, and data on accessory equipment including irregular shaped punches and dies. Punch capacity for the No. 16 is a ⅜" hole through ¼" mild steel; and the No. 17, a ¼" hole through ¼" mild steel. Whitney Metal Tool Co., 110-114 Forbes St., Rockford, Ill., supplies copies of this bulletin, or — **B23.**

"Electric Resistance Weld Tube Mills" explains the use of modern tube mills in the manufacture of pipe and tubing. This 64-page booklet provides a step-by-step description of the electric-weld process from roll forming and shaping of the tube to the finished product. This booklet is being offered again by The Yoder Co., 5500 Walworth Ave., Cleveland 2, or — **Circle No. B24.**

"Materials Handling Conveyors and Systems" is designed to help select hinged steel belt conveyors for handling scrap, chips, stampings, forgings, heavy parts, and assemblies. Standard components can be assembled to suit the individual job. Catalog MF-100 is supplied by May-Fran Engineering, Inc., 1726 Clarkstone Rd., Cleveland 12, or — **B25.**

Consistently Controlled Preload, minimum size and weight, plus speed of installation are advantages of the Hi-Lok fastener discussed in a bulletin. The residual-ultimate tension and tension-tension fatigue are given in chart form for easy evaluation. Bulletin 2-1506 is available from Hi-Shear Rivet Tool Co., 2600 W. 247th St., Torrance, Calif., or — **Circle B26.**

Three-Way Pneumatic Pilot Valves have rugged construction, and are fast acting with only 1/32" travel required. They are easy to install and maintain because they require no electrical circuits. Diagrams show the different types of mountings and other construction features. This catalog is available from Logansport Machine Co., Inc., Logansport, Ind., or — **Circle Inform-A-Gram No. B27.**

CIRCLE INFORM-A-GRAM KEY NO. 77

ACME HYDRIVE

increases production

...and makes a hand operated turret lathe dependably automatic

Acme, with 35 years of experience in the manufacture of drill jig bushings which require precision straight holes, has developed for the industry a hydraulically operated turret drive for powering self-indexing lathes. Hydrive will adapt to turret lathes from bench sizes to No. 5 and automatically operate the turret, feed the cross slide, change spindle speed, advance bar stock, reverse direction of spindle rotation for tapping, and open and close collet.

The reasons for increased production are simple! The uninterrupted operations of Hydrive continue, manned or not, after basic set up. A continual inspection can be maintained while Hydrive operates assuring less rejections in final stages. Hydrive always improves finish and quality of your parts.

For further information check this coupon. Also check for free showing of the Acme Hydrive film.

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CIRCLE INFORM-A-GRAM KEY NO. 78

"Typical Applications of Tooling Accessories" illustrates by photos and diagrams the usual and unusual applications of Vlier standard tooling accessories. Uses of fixture keys, spring plungers, swivel-pad clamps, torque thumb screws, and toggle pads are given. The bulletin is available from Vlier Engineering Div'n, Barry Controls Co., 8900 Santa Monica Blvd., Los Angeles 46, or — **Circle Inform-A-Gram Key No. B28.**

Magnetic Perforating Dies for perforating materials up to and including ¼" thick mild steel are illustrated and discussed in a bulletin. Detailed diagrams are given for each type of die, and, to determine pressure required for punching, a chart shows the material thickness and pressure in tons. Write S. B. Whistler & Sons, Inc., 744 Military Rd., Buffalo 23, for Catalog M-55, or — **Circle Inform-A-Gram Key No. B29.**

"Screw Machine Tools and Spring Collets and Feeding Fingers" is the title of a catalog which features and gives dimensions of all types of tools. The 112-page catalog includes diagrams for such items as tool posts, die holders, centering and facing tools, and pointing tools. Write to Brown & Sharpe Mfg. Co., Providence 1, for a copy of Catalog 36S, or — **Circle Inform-A-Gram No. B30.**

Air-Operated Press Type, low-impedance, single-phase welders are detailed in a bulletin. The Type SP 2 spot welder and Type EP 2 projection welder are fully explained and illustrated. They can be used for a wide range of high production fabricating applications. Get Bulletin 317-2R from Sciaky Bros., Inc., 4915 W. 67 St., Chicago, or — **No. B31.**

"Automatic Plate and Sheet Handling Systems" is the title of a bulletin which discusses the various types of systems available. These include floor-rail types, overhead rail types, and radial types. Characteristics and dimensions are listed. Write to Noble Co., P. O. Box 1979, 1860 7th St., Oakland 4, Calif., for Bulletin B-500, or — **Circle No. B32.**

Cutting and Coloring Buffs are offered in a catalog from Hanson-Van Winkle-Munning Co., Inc., Matawan, N. J. Types include bias-cut cloth, sisal on a bias, cloth-covered sisal, alternate layers of sisal or cloth in contour patterns, and folded cloth construction. Range of applications and specifications for each type are given. Get a copy from the company, or — **No. B33.**

Pneumatic Pull Tool Nomenclature is listed, and the five basic pneumatic units available for faster installation are discussed, in a bulletin. A ready-reference table is provided for quick determination of the fasteners that can be installed with each pneumatic tool. Catalog 8-421 is released by Huck Mfg. Co., 2480 Bellevue Ave., Detroit 7, or — **Circle No. B34.**

A Precision Mount for Heavy Machinery, Wedgmount, is discussed in a catalog. Wedgmount makes possible precision installation and immediate leveling with the turn of a screw. No bolting or cementing to the floor is necessary. Request this catalog from Clark-Cutler-McDermott Co., Franklin, Mass., or — **B35.**

The New King Electrically-Controlled Vertical Boring and Turning Machines are highlighted in a catalog. Features include increased horsepower, expanded feed and speed range, complete electrical controls, and direct-reading speed and feed selection dials. Catalog K-7 is issued by King Machine Tool Div'n, American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, or — **Circle Inform-A-Gram Key No. B36.**

END MILLS ARE OUR BUSINESS . . .
NOT A SIDELINE

TO BEST SERVE YOUR NEEDS . . .

For over twenty years our designing and manufacturing abilities have been exclusively devoted to producing highest quality end mills. Because end mills are our only business, we realize that universal acceptance of our product is obtained and maintained by continuously supplying the best end mills available. Putnam manufactures and stocks over 1700 standard types and sizes of end mills. Thus, you can quickly and economically select the exact size and type to best meet your needs.

Putnam Distributors from Coast-to-Coast carry large stocks of standard end mills. Contact your neighbor, the local Putnam Distributor, he will recommend the best end mill for specific jobs, give you personalized service, and quickly supply your needs with the finest end mills obtainable.

PUTNAM TOOL COMPANY
2981 CHARLEVOIX AVENUE · DETROIT 7, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 79

Abrasive Belt Flat Finishing Machines are offered in a bulletin from Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo, Mich. Flat work can be done with ease on these single- and multi-head machines, which come with heads to accommodate belts 6", 8", 10", and 12" wide. Bulletin 751 is available from the company, or — **B37.**

Stupalox Single-Point Cemented Cutting Tools, covered in a catalog, are used in turning, boring, facing, and chamfering operations on steel, cast iron, and non-ferrous metals. The tools may be ground to suit specific applications. Stupalox Dept., New Products Branch, The Carborundum Co., Latrobe, Pa., furnishes the catalogs, or — **Circle B38.**

Cost Saving Possibilities of IRD Systems for machinery maintenance are detailed in a folder. Problems such as bearing failure, noise, vibration, leaky seals, misalignment and chatter; their solution; and cost saving benefits, are discussed. Write to International Research and Development Corp., 6150 Huntley Rd., P. O. Box 55, Worthington, Ohio, for your folder, or — **Circle No. B39.**

Does more . . . costs less

NEW! LOGAMATIC "400" BY *Logan*

FIRST of a new series of automated turret lathes, the *Logamatic "400"*—with 14-inch swing and 1⅝-inch spindle hole—puts profit in short or long production runs with an ease, accuracy and flexibility not previously available in its price range . . .

FOR MORE INFORMATION about the new Logamatic "400", drop a line to:

LOGAN ENGINEERING CO.

Dept. M-658, 4901 Lawrence Ave., Chicago 30, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 80

"Automated Deburring Machines" discusses a wide variety of types ranging from those for low- and medium-volume production plants to completely automated types for high production lines. Deburring tools are also presented. Get a copy from Acme Mfg. Co., 1400 E. 9 Mile Rd., Detroit 20, or — **Circle No. B40.**

"Enables One Drill Press to do the Work of 5!" describes the Digimatic control system for table positioning. Cost-saving advantages are presented along with the step-by-step comparison between automatic and hand drilling of typical parts. Electronic Control Systems Div'n, Stromberg-Carlson Co., 2231 S. Barrington Ave., Los Angeles 64, supplies copies of this bulletin, or — **Circle No. B41.**

Forging, Straightening, Bending, Forming, and similar operations can be done with the Elmes hydraulic C-frame presses. Outstanding features discussed in a catalog include the extra-rigid main press frame, the press ram of semi-steel fitted at the head end with step-seal piston rings, and the simplified hydraulic circuit. Contact Elmes Engineering Div'n, American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, for your copy of Bulletin 1015, or — **B42.**

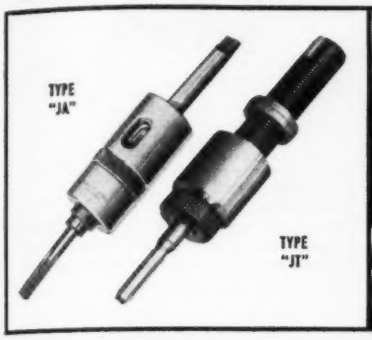
Provide a Positive Identification of Lubrication Points on machine tools, and lubrication equipment and containers with the marking system outlined in a bulletin. The Lubri-Cal markers are resistant to abrasion, weathering, oil immersion, and temperature variations. Get a copy of "Meyercord Lubri-Cals" from the Meyercord Co., 5323 W. Lake St., Chicago 44, or — **Circle No. B43.**

Socket Set Screws, Dowel Pins, socket head cap screws, stripper bolts, and pipe plugs are among the items included in a catalog. A complete listing of each type and size is given. Request copies of Catalog SS106 from Abbott Screw & Mfg. Co., 1728 W. Walnut St., Chicago, or — **Circle Inform-A-Gram No. B44.**

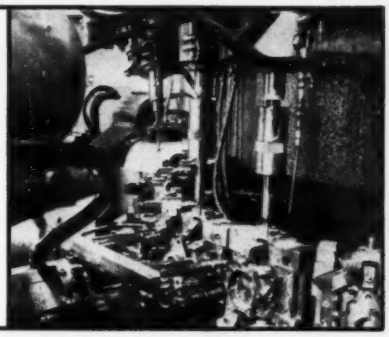
Steel Tote Boxes for work handling and storage uses are highlighted in a bulletin which also gives dimensions on shop desks and service carts. Direct requests for Bulletin 5800 to Angle Steel Inc., Plainwell, Mich., or — **Circle No. B45.**

A Cam Miller and Cam Grinder are highlighted in a bulletin which gives descriptions and specifications for each machine. Included are pictures and explanations of the attachments available. For Catalog M-58, write to The Rowbottom Machine Co., Inc., Waterbury, Conn., or — **Circle Inform-A-Gram No. B46.**

Floating Holders Insure Precision on Reaming and Tapping Operations



Scully-Jones floating holders have small body diameter for close center work. Type "JT" speeds tool changes.



Scully-Jones "JA" floating holders permit drilling and tapping at high speeds with outstanding accuracy.

Scully-Jones design means fewer rejects, less tool breakage, even on high-volume jobs

Misalignment between spindle and workpiece can affect quality, cutting tool life, production rate, and maintenance costs. But, if you attempt to compensate for errors by using "wobble-type" floating holders, you can create other problems that defeat your purpose.

Binding or "dead" spots in certain holders can cause bell-mouthed, or out-of-round reamed holes—oversized or tapered threads. "Cramping" can break fine cutting edges, reduce tool life, and hold up production.

Scully-Jones floating holders guard against misalignment problems caused by index error, machine wear, manufacturing tolerances, and expansion or contraction of machines due to temperature variations by meeting the following specifications:

1. **Balanced, constant velocity, flexible drive coupling**
2. **Freedom of lateral or angular movement**
3. **Uniform force requirement for moving in all directions**
4. **Efficient operation after normal wear**
5. **Minimum efficiency reduction from normal shocks and overloads**
6. **Sufficient and efficient seals, with proportional physical dimensions**
7. **Provision for centering pin**

By far the most important feature to meet these specifications is our exclusive *double-gear spline drive coupling*. This permits utilizing proper clearance in the spline for required movement of the tool and allows equal freedom of float in all directions. Binding or "dead" spots are eliminated.

Write for Bulletin 8-50. Scully-Jones and Company, 1913 South Rockwell Street, Chicago 8, Illinois.

SCULLY JONES **PRECISION HOLDING TOOLS**

CIRCLE INFORM-A-GRAM KEY NO. 811

DYKEM STEEL BLUE
Stops Losses
making Dies and Templates
Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.
Write for sample on company letterhead
THE DYKEM COMPANY
2303L North 11th St. • St. Louis 6, Mo.
With DYKEM Steel Blue
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CIRCLE INFORM-A-GRAM KEY NO. 812

Regardless of hole sizes, center distance is measured quickly . . . accurately with CENTER-MIKE®

THE BOOSTER-BAR

A new accessory — gives 65% increase in the capacity of your present Center-Mike

WRITE FOR BULLETIN #955

SORENSEN CENTER-MIKES, Inc.
264 KOSSUTH ST., BRIDGEPORT 8, CONN.

ONLY CAPEWELL BAND SAWS are CRAVENIZED*

for

- Strongest Tooth Structure
- Freedom from Gullet Cracking
- Maintained Cutting Edge
- Longest Life

***Cravenizing:** A process, exclusive with Capewell, which controls the depth of hardness of the cutting edge, blending it into the back. The result is a saw with extra tough teeth on a flexible blade.

5 TYPES FOR EVERY PURPOSE

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Cutoff
Skip Tooth
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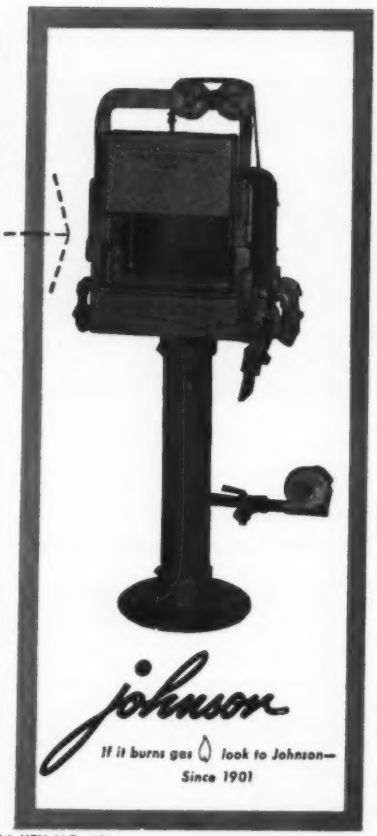
THE CAPEWELL MFG. CO.
HARTFORD 2, CONN.
CIRCLE INFORM-A-GRAM KEY NO. 814

CIRCLE INFORM-A-GRAM KEY NO. 813

HEATS FAST SAVES TIME



johnson

NO. 142 HEAT TREATING FURNACE

Start heat treating high speed and carbon steels while other furnaces warm up. Powerful burners in this efficient furnace get heat up to 1300°-2350° F. range in minutes. Temperatures accurately and quickly regulated. Ratchet-operated door opens upward — no need to open fully every time. High temperature refractory-lined firebox keeps heat uniform — 7" by 13" by 16½". 200,000 BTU's per hr. Carbofrax hearth, G.E. Motor and Johnson Blower included ..... F.O.B. Factory $358.00

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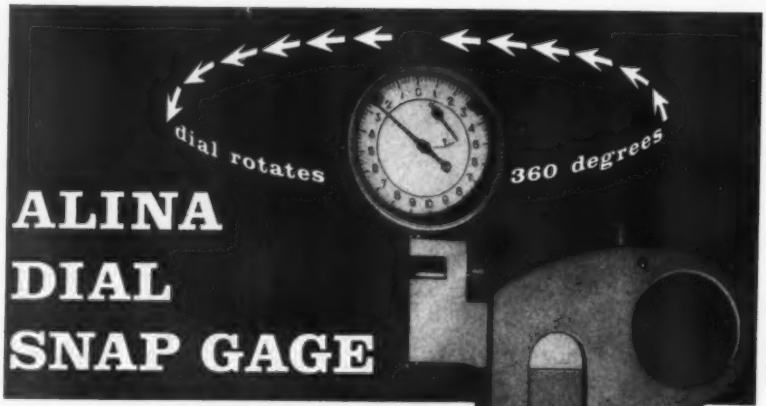
If it burns gas look to Johnson—
Since 1901

CIRCLE INFORM-A-GRAM KEY NO. 821



ALINA DIAL SNAP GAGE

ALWAYS REPEATS

The No. HO 1 is ideal for rapid and accurate measurements of a wide variety of parts ranging in size from 0-1". It has a throat depth of 11/16" and the indicator may be *rotated thru 360°*. The HO 1 may be used with either the right or left hand. Both anvils are Tungsten Carbide to provide long and accurate on-the-job service. Furnished in handsome hardwood case.

Model No. HO 1
Graduated .0001"

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ALINA CORPORATION

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CIRCLE INFORM-A-GRAM KEY NO. 822

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MU 1-2800
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WO 1-4726
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THE INDUSTRIAL MACHINE CO.
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CIRCLE INFORM-A-GRAM KEY NO. 823

A Finger Tip Control Micrometer, described in a bulletin, has a convertible thimble which permits the micrometer to be used either as a friction or fixed type. Oblique angle graduations on the barrel provide positive reading regardless of the thimble position; the micrometer has a range of 0 to 1", with readings in 0.0001". Get your copy of Circular M68 from Brown & Sharpe Mfg. Co., Providence 1, or — **Circle No. B47.**

A Medium-Capacity High-Pressure Coolant Unit helps make possible the conversion of conventional machines for precision gun type drilling. The high pressure delivery of coolant to the cutting edge permits uninterrupted deep hole drilling at high production speeds. Other advantages and dimensions are found in a bulletin supplied by Madison Industries, Inc., Muskegon, Mich., or — **B48.**

Deeper, Heavier and Cooler Cutting, faster production, and less dressing are among the advantages listed for K and KP vitrified bonded grinding wheels discussed in a bulletin. These wheels hold form while giving fast stock removal and can be used on a wide variety of metals. Write to American Emery Wheel Works, Richmond Square, Providence 1, for a copy of the bulletin, or — **Circle Inform-A-Gram No. B49.**

Select the Correct, Most Economical Die Set for each job — based on die weight, press speed, and production run length — from a catalog. The three classes of straight-sided die sets are explained and specifications are listed in chart form. Ask for Catalog 580 from Standard Die Set Co., 1501 Elmwood Ave., Providence 7, or — **Circle No. B50.**

Added Capacity is one of the features of the Screwmatic 750, a ¾" single-spindle automatic, discussed in a catalog which also lists the new clutches, motors, and transmissions. A chart gives capacities, spindle speeds, and information on the turret and spindle. Write to The Gear Grinding Machine Co., 3901 Christopher, Detroit 11, for a copy of the fiftieth anniversary catalog, or — **Circle Inform-A-Gram Key No. B51.**

A Stainless Steel All-Purpose Unitized Safety Enclosure for precision instrument assembly is highlighted in a bulletin. Specifications and a complete description of the unit and a list of component parts available to adapt the enclosure to a particular need, are included. Write to S. Blickman, Inc., 8400 Gregory Ave., Weehawken, N. J., for Bulletin A-11, or — **Circle No. B52.**

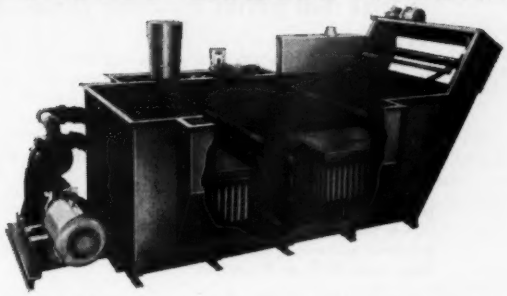
"Aircomatic Welding Equipment" gives operation and construction features of all types of pull and push guns, wire feeders, and hand guns. The advantages of inert-gas-shielded metal arc welding are given, and schematic drawings are included. Get Catalog 2350 from Air Reduction Co., Inc., 150 E. 42nd St., New York 17, or — **Circle No. B53.**

A Straight Line Indexing Machine Chassis, Auto-Tran, is the subject of a catalog from Swanson-Erie Corp., 814 E. 9th St., Erie, Pa. Auto-Tran can be used as the basis for a completely automatic special machine, or as a transfer machine. Get a copy from the company, or — **No. B54.**

Heavy-Duty Hydraulic Cylinders are described in a bulletin which features a detailed diagram of the cylinder and points out the special construction features. A chart of the dimensions and a list of accessories and special types of cylinders are included. Get Bulletin H-101 from Lindberg Air & Hydraulic Div'n, Teer, Wickwire & Co., 1936 Wildwood Ave., Jackson, Mich., or — **Circle Inform-A-Gram Key No. B55.**

For Super Finishes at Less Cost

Delpark **Dual Manifold, Vacuum Filter-Matic Filter**



Dual Manifold Tubular Screen Filter shown.

Leaf Type Filter Elements also available.

SUPER finishes no longer carry a high cost per unit. The reason is the high efficiency filtering action of the Delpark Dual Manifold Filter-Matic.

1. The rejection rate is greatly reduced.
2. Accuracy is more easily attained because of the reduced coolant temperature.
3. Machine maintenance time is reduced.
4. Filter servicing is no longer required.

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Helping Leading Manufacturers Give You Better Machine Tools!

We at True-Trace are proud to be a part of and contribute to the above manufacturers' reputation in producing accurate, dependable tracer and numerically controlled machines–equipment that can be counted upon to produce the precision, complex parts so vital in today's metalworking industry. These leaders know they can depend upon True-Trace machine tool controls to do the best job. After complete investigation of various control systems available, they, with others, have selected True-Trace as original equipment.

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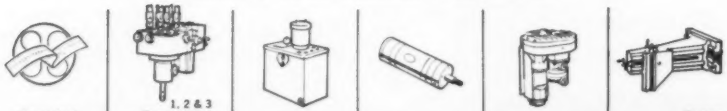

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CIRCLE INFORM-A-GRAM KEY NO. 84

Presenting . . . Representing . . .

Exclusive representative for the Pittsburgh and western Pennsylvania area for Porter Precision Products is Saville and Co. They will carry a complete line of Porter and Durable sleeve supported punches for the stamping and tool and die industries.

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Freeland Gauge Co. has announced the appointment of Quality Control Corp. as their representative in the New York State counties of Orange, Putnam, Rockland, Westchester, Bronx, Kings, Queens, Richmond, Nassau, and Suffolk. The representative will offer the complete line of air gages, air gage reconditioning services, and gage engineering.

•

New Connecticut sales representative for the Eldorado Tool and Mfg. Co. is E. M. Benson Co., Inc. of Meriden, Conn.

•

Moehlenpah Engineering Inc. of St. Louis, and Butcher, Carter & Preston, Inc. of Houston, Texas, have been appointed to handle sales of the high speed strip and sheet fabricating equipment manufactured by Dahlstrom Machine Works, Inc.

•

The appointment of the following machine tool distributors was made recently by The Connecticut Tool & Engineering Co.: Dawson Machinery Co., Washington; Brett Machinery, Illinois and northern Indiana; William Scheer Co., southern Illinois and eastern Missouri; R. C. Neal Co., northern New York; and H. Wilson Ryno of New Jersey, Metropolitan New York and Long Island.

•

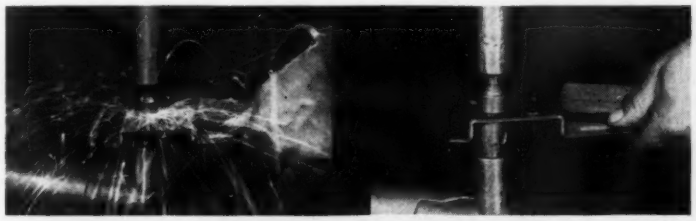
The Abrasive Div'n of Elgin National Watch Co. announces the appointment of five new stocking distributors handling the company's line of Golden Circle solid carbide tools. They are A. B. C. Sales Co., northern New Jersey; Medio Co., Manhattan and Bronx, New York; See-Lect Industrial Equipment Co., New York; Southern Tool Distributing Co., Georgia; and Monnier Tool & Supply Co., Dayton, Ohio.

PARKER-KALON, originators of the Self-tapping Screw, has now developed the P-K® RIMGUARD* WELD SCREW. It has a strong, protective rim and four weld projections. Companies who have already tried the RIMGUARD tell us it is the best weld screw they've ever used.

The new rim minimizes "flash" and "spatter". Finished work is cleaner, neater—shows no burn or discoloration. And operators like the new protection. The RIMGUARD requires less current, limits the amount of pressure applied during the fusion stage, controls the flow of the fused projections, and reduces the possibility of "flower-out" or "blow-out".

Try the new P-K RIMGUARD WELD SCREW for yourself. You'll find the new 4-Projection design assures proper weld area, develops the full strength of the weld with both thin and heavy gage steels. The RIMGUARD gives better seating of the head against the work. Openings between head and work are eliminated, thus providing protection against moisture condensation and corrosion—a distinct advantage where work is to be enameled or porcelainized.

P-K RIMGUARD WELD SCREWS are available from your nearby Industrial Distributor in Type WS-T with projections on top the head and Type WS-U with projections under the head. Sizes or finishes other than stock items can be supplied on special order. P-K Field Engineers will be glad to help solve unusual application problems.*



Welding operation with ordinary weld screw. Note flash and spatter—a hazard to personnel and a source of discoloration.

Rimguard minimizes spatter—controls flow of fused projections—safeguards both the work and the operator.

SOLD EVERYWHERE THROUGH INDUSTRIAL DISTRIBUTORS

Prompt service—In any quantity

PARKER-KALON® Rimguard* weld screws

PARKER-KALON DIVISION, General American Transportation Corporation, Clifton, New Jersey

Manufacturers of Self-tapping Screws, Socket Screws, Screwnails, Masonry Nails, Wing Nuts and Thumb Screws *Pat. Pending

CIRCLE INFORM-A-GRAM KEY NO. 85

PRODUCTS on PARADE

For more information about the products described here, use POSTAGE-FREE Reader Service Card in this issue.

A Cylindrical OD Dual-Purpose Grinding Attachment can be used on grinding operations or as an inspection fixture. True dead centers assure concentricity to 0.0001" total indicator reading. A built-in sine

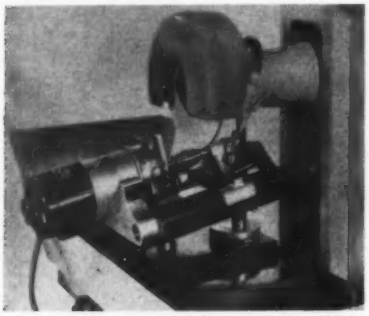
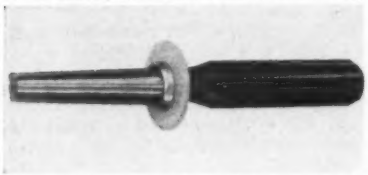


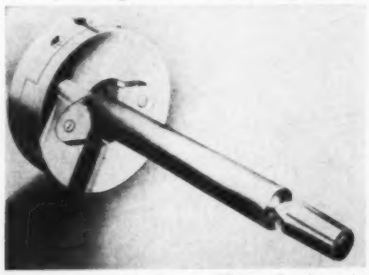
plate and micrometer permit grinding and inspection of tapers within seconds of an arc. For information, write Gebhart Machine Tools, Ltd., 1608 Victory Blvd., Glendale, Calif., or—**Circle Inform-A-Gram No. A1.**

Clean Spindles, Quills, and Sockets on machine tools and drill presses with a taper chuck cleaner. The cleaner utilizes the static action of special plastic blades with the aluminum shaft, which holds the blades,



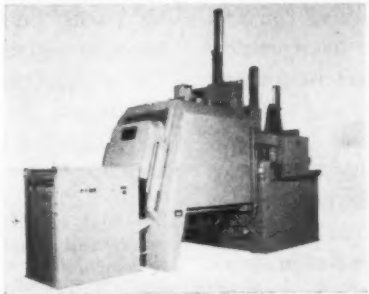
to attract and hold all chips and grit present in chucks. For literature, write James Products Co., 801 Mentor Ave., Mentor, Ohio, or — **A2.**

A Work Driver with serrated jaws milled on an angle to grip work better is used on any type of engine lathe, multiple tool lathe, or plain or



universal grinder. This device is self-centering, quick acting, and positive. For information write, Seneca Falls Machine Co., 11 Fyfe Bldg., Seneca Falls, N. Y., or — **Circle Inform-A-Gram No. A4.**

Straight-Through Heat Treating Units have been improved to insure proper circulation of the quenching medium, and continuous lubrication



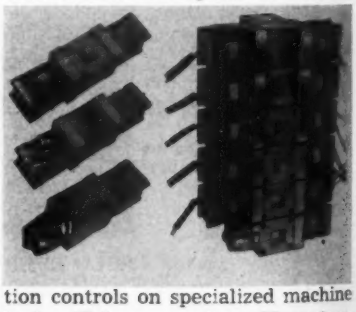
of drive components. The Model B has large oil float that gives more positive indication of the oil level. Write to Ipsen Industries, Inc., 721 S. Main St., Rockford, Ill., or — **A5.**

A Pre-Colored Dark Blue, oil hardening flat stock, Ready Mark precision ground tool steel, is ready for marking or layout and eliminates the usual costly, time-consuming

bluing and drying. The rust-resistant finish does not affect heat treatment. Sizes from 1/16" thick to 14" wide, all 18" long are available from Brown & Sharpe Mfg. Co., Providence 1, or—**Circle Inform-A-Gram No. A6.**

An Improved Shock Steel with high toughness at high hardness levels has been developed by Crucible Steel Company of America, Oliver Bldg., Pittsburgh 22. LaBelle HT is for applications requiring unusual resistance to shock or impact such as shear blades, and impact extrusion tools. Cold heading LaBelle steel punches average 60,000 pcs compared with 4,000 to 10,000 pcs made with punches or other steels it is reported. ..**Circle No. A7.**

A Small Hi-Cyclic Air and Hydraulic Manifold Mounted Valve is designed to provide an extremely compact multiple valve installation with a common subplate for automa-



tion controls on specialized machine tools. Valves mount on 2" centers, and up to six units can be mounted on one manifold. For information, write The Beckett-Harcum Co., Wayne Rd., Wilmington, Ohio, or — **Circle Inform-A-Gram No. A8.**

A New, Automatic High Speed Welding Process and Equipment arc welds steel at speeds ranging up to 300 ipm. The Innershield process uses a flux-containing coiled wire electrode that produces a vapor shielding for an open arc. Elimination of the externally applied flux also cuts down wear and operating difficulties in fixtures or welding machinery. Speeds in 14-ga lap welds in the horizontal position range around 150 ipm, and typical jobs include small diameter circular or round-about welds. The Lincoln Electric Co., Cleveland 17, or — **Circle No. A3.**

Most Drilling Per Dollar!

Features Found Only In Highest Priced Radials

- Finger-Tip Clutching
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- Centralized Controls
- Hardened Column & Way Inserts
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- Head Glides on Ball Bearing Rollers

Refer to Sweet's Machine Tool File (LAIVE) for our catalog

Send for Brochure of **Veet's** 16 Points of superiority and name of nearest dealer, who will arrange actual demonstration of the **Veet** Radial, in your plant, without obligation.

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CIRCLE INFORM-A-GRAM KEY NO. 871

CUT PRODUCTION COSTS!

MARK
NAME PLATES
5 TIMES FASTER

MODEL EMT-2
ELECTRIC TAG TYPEWRITER
A touch of the finger delivers up to 2 tons pressure for deep, legible impressions in metal or plastic tags.

—WITH—
Automark
ELECTRIC TAG MARKING MACHINES

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HI-SPEED
TAG MARKING MACHINE
Automatically marks BOTH constant and serial numbers at any desired speed up to 8,000 tags per hour!
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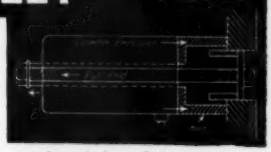
PULL HYDRAULICALLY AND SAVE TIME EFFORT MONEY



THE STAR CENTER HOLE RAM eliminates need for cumbersome auxiliary rigging on many otherwise tedious, time-consuming jobs. Works in congested areas — anywhere and in any direction.

Controlled by a hydraulic pump, it pulls out shafts, pistons, pinions, bushings, cylinder liners; replaces gears, wheels, propellers; tensions cables and rods for prestressed concrete. Also used as jack for lifting, pushing, or pressing.

A threaded rod inserted through center hole is shown pulling out bushing.

Capacities:
30, 60, 100, 150, 200 Tons

Special engineering counsel and proposals cheerfully submitted on request

Representative areas available.

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Extra Capacity with hall COLLET CHUCKS

for SPEED, ACCURACY, ECONOMY

Automatic adjustment speeds up production in multiple operations with push-out type HALL COLLET CHUCKS. Full spindle capacity or over. Tremendous grip over or under stock size. Without adjustments. Shortest overhang. All grip ...no slip. No bearings...no heat or lost power. Instant release without stopping lathe.

SATISFACTION GUARANTEED!

Made in Three Sizes to Fit Your Requirements:
Model A...1" (max. capacity 1-1/16")
Model B...2" (max. capacity 2-1/16")
Model C...3" (max. capacity 3¼")

Write today for illustrated catalog and price list

HALL MANUFACTURING COMPANY
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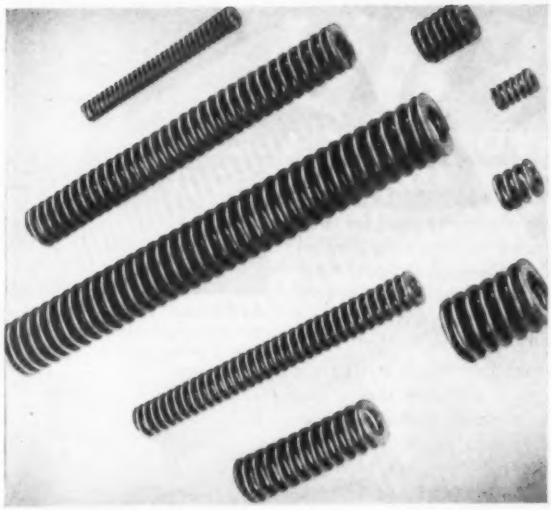

Die Springs

Chrome vanadium die springs in stock in a wide variety of hole and rod sizes, lengths and deflections. Medium, medium-heavy, heavy duty for increased life and reduced down time. Write for list of specifications and prices, and name of nearest distributor.

Raymond Manufacturing Division

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SCREW MACHINE TOOLS!

CUTTING CAMS
HIGH SPEED STEEL AND CARBIDE FORM TOOLS
SPECIAL CUTTING TOOLS
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47 years experience goes into every tool we make. They come to you ready for use . . . Precision design . . . Skilled workmanship . . . Finest materials.

Our extensive facilities save you TIME . . . MONEY . . . and give you accuracy, quality and quick service.

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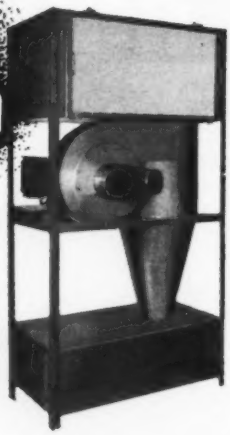

Easy installation . . . efficient low-cost operation . . . simplified maintenance, make Dustkop *FIRST* among equipment to collect most all industrial dusts. There are Dustkop models to eliminate your dust problems . . . that are space saving, self-contained units, or exhaust type for rafter, ceiling or outside location. Write for descriptive literature.

DUSTKOP® STOPS DUST

37 STANDARD MODELS TO CHOOSE FROM
• READY TO USE

Also a Complete Line of Mist Collectors

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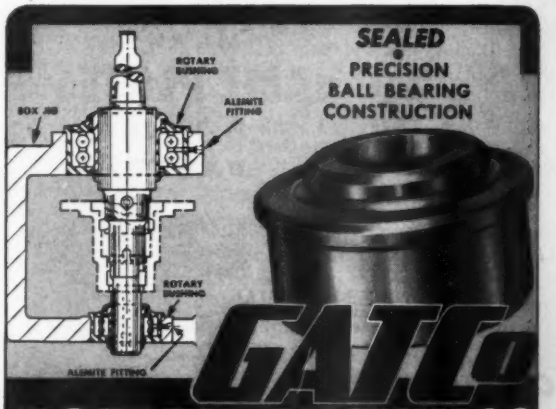

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GATCO ROTARY BUSHINGS

For DRILLING, CORE DRILLING, ROUGH and FINISHED BORING

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work — or both.

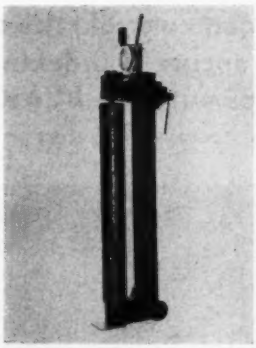
Eliminates expensive tool construction — Reduces tool wear — Prevents seizure and pilot breakage — Especially adapted where precision is required.

Write for full information and prices

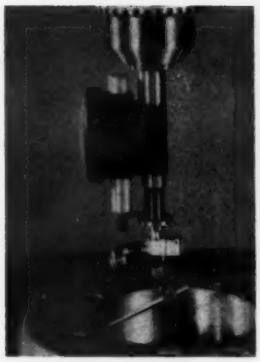
GATCO ROTARY BUSHING CO.
42322 ANN ARBOR RD., PLYMOUTH, MICH.
Telephone PLYMOUTH 1472

CIRCLE INFORM-A-GRAM KEY NO. 884

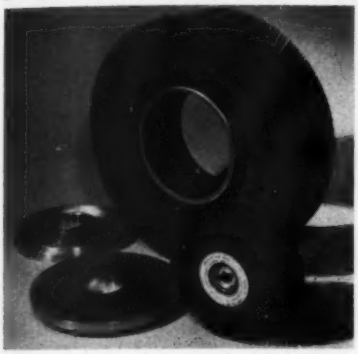
Make End Tests on Cylinders, die blocks, and large testings with the Brinell tester. This hardness tester has a capacity of 29" or more with a throat of 3½". The portable instrument weighs only 45 lbs and can be used in any position. King Tester Corp., 440 N. 13th St., Philadelphia 23, or —
Circle No. A9.



The Center-Finder accurately locates the spindle of a jig boring machine, vertical or horizontal milling machine, or boring mill drill press in the center of a hole or plug to rebore old holes, bore new holes in relation to old ones, or locate holes in new work. The Precision Gage and Tool Co., Dayton, Ohio, or —
Circle No. A12.

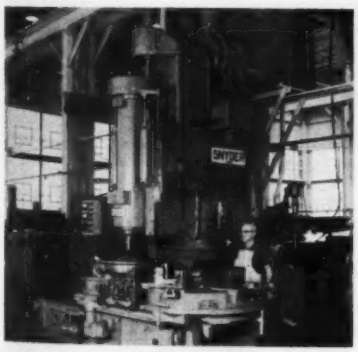


For Polishing and Finishing Contoured and Flat Metal Surfaces use the versatile flap wheel which is particularly suited for use on fully



automatic polishing jack operations. It is also adaptable on any standard bench grinder in place of a worn brush. For information, write Behr-Manning Co., Troy, N. Y., or —
Circle Inform-A-Gram No. A10.

A Vertical Boring Machine using low-production automation techniques to speed production of heavy parts, is available from Snyder Tool & Engineering Company, 3400 E. Lafayette Ave., Detroit 7. Parts



weighing up to 700 lb are loaded into a two-position, line-index type fixture while another is being bored. Hydraulically-operated five-jaw chucks permit the holding of different parts of different diameters.
Circle Inform-A-Gram No. A11.

2548

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this

DIE-PART PORTELVATOR®

(OR AN ENGINEERED VARIANT)

will speed your work
and ease your "handling."

Top plate raises and lowers for fitting operations and rotates 360° to give easy access to die.

Write for our FREE Bulletin No. 2548. It gives full details.

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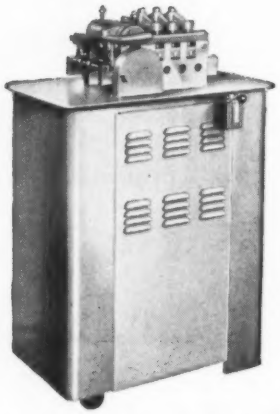
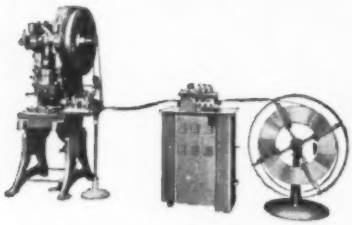
CIRCLE INFORM-A-GRAM KEY NO. 89

FLEXIBILITY
in Stock Straightening



WITTEK
STOCK STRAIGHTENERS

Used in conjunction with a reel stand and automatic feed for punch presses, the Wittek Stock Straightener is a self-contained, motor-driven unit designed for maximum efficiency in the continuous straightening of coiled stock. Standard models handle stock with widths up to 12 inches. An infinitely variable speed drive permits any desired straightening speed so that the proper slack is maintained in the straightened strip between the unit and the press feed.



This typical Wittek automatic production feeding setup includes—Wittek roll feed mounted on the punch press, Wittek stock straightener, and Wittek self-centering reel stand.

Write for full particulars

WITTEK Manufacturing Co.

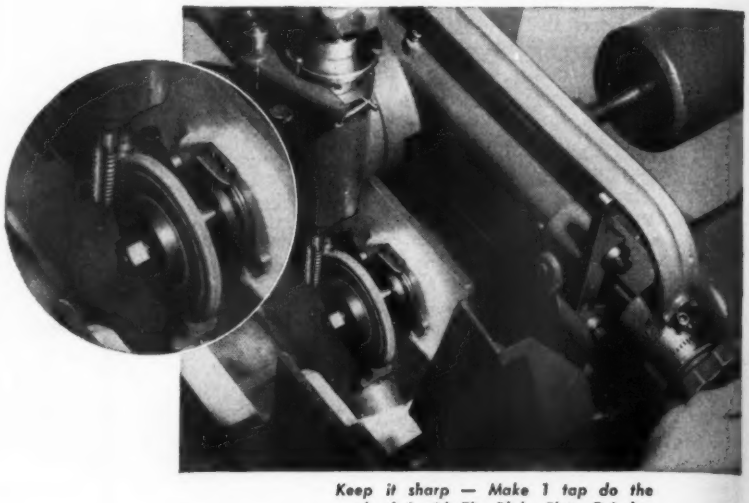
Production Feeding Equipment

4323 W. 24th Place • Chicago 23, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 901

NOW – You can control rake or hook angle and insure accurate indexing of cutting edges* of taps with the BLAKE FLUTE GRINDER.

**Just as necessary on taps as on milling cutters.*



Keep it sharp — Make 1 tap do the work of 6 with The Blake Flute Grinder.

This accuracy will result in uniformity of hole, much longer life for your taps and a surprising savings in tap costs.

Write for bulletins on BLAKE Tap Sharpening Machines

EDWARD **BLAKE** COMPANY INC.

MANUFACTURERS OF FLUTE AND CHAMFER GRINDERS

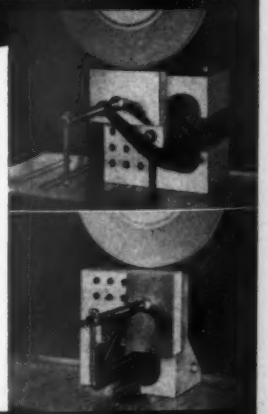
442 CHERRY ST., WEST NEWTON 65, MASS.

Exclusive Distributers of:

Black Diamond Drill Grinders • Surface Finish Standards • Worcester Drill Grinders

CIRCLE INFORM-A-GRAM KEY NO. 902

NEW Federal Square Master
ANGLE PLATE



Will Grind A Work Piece Square The Easy Way Without Skilled Help

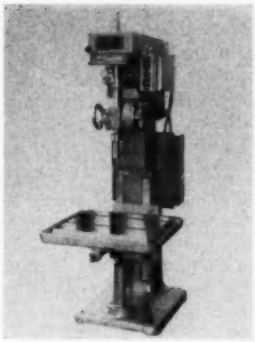
Designed for grinding a work piece to exact squareness, whether it be a component of a jig, fixture, gauge, or die; eliminating an indicator, precision square, surface plate, and use of top skilled help on routine jobs. Can also be used on layout work and inspection. This precision tool is built of high grade steel, stabilized, hardened and ground. ALL WORKING SURFACES ARE GUARANTEED TO BE SQUARE within two-tenths of a thousandth . . . (.0002). Write for complete literature describing other outstanding features.

Note adjustable set edge and recess for C-clamp. ➔

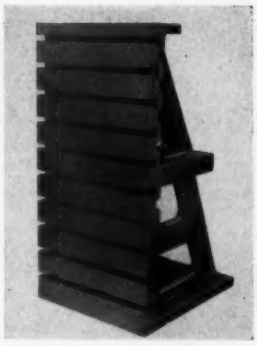
FEDERAL MACHINE TOOL COMPANY, EMMETT STREET, BRISTOL, CONNECTICUT

CIRCLE INFORM-A-GRAM KEY NO. 903

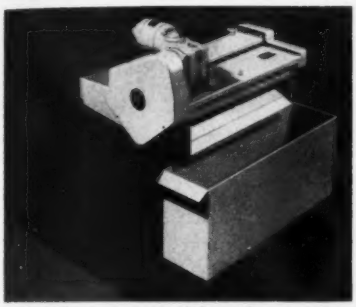
Straight, Accurate, and Smooth Holes can be produced at production rates in a single operation using the extra-rigid, vertical gun type drilling machine. Rated capacity is 5/8" and Model 2G drills holes up to 7½" deep, using continuous feed and variable high speed. Edlund Machinery Co., 50 Huntington St., Cortland, N. Y., or — **Circle No. A13.**



Greater Flexibility in Set-Up Applications is a feature of the block type stack angles which come with machined, ground, or scraped finishes. The stack angles come in two sections, can be used singly or in combination, and are available in sizes up to 11' high. Machine Products Corp., 6771 E. McNichols Rd., Detroit 12, or — **Circle No. A16.**

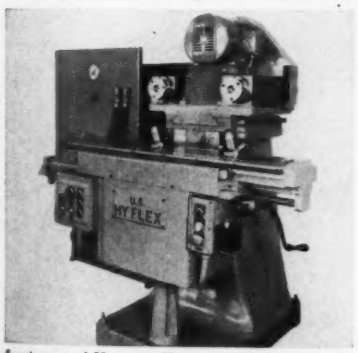


Power Grip Magnetic Coolant Separators offer completely automatic coolant cleaning and can be easily installed on numerous types of grinding, honing, and gear-shaving machines. Available in 25, 50, 75,



and 100 gpm capacities, the separators can usually be placed on top of an open coolant tank. For information, write Magnetic Div'n, Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill., or — **Circle Inform-A-Gram No. A14.**

A Milling Machine for high production applications can be equipped with as many as three spindles positioned as required and with any electrically-controlled hydraulic table feed cycle. This Hy-Flex machine



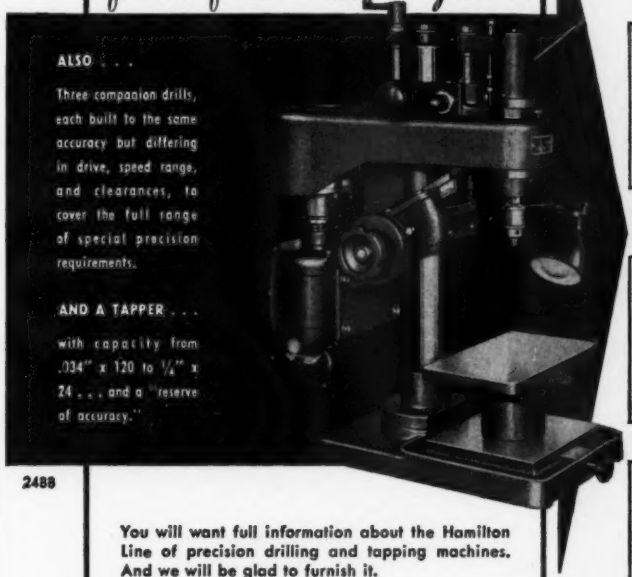
features idler pulleys which permit changing spindle position while furnishing proper belt tension. For information, write U. S. Burke Machine Tool Div'n, Brotherston Rd., Cincinnati 27, or — **Circle Inform-A-Gram No. A15.**

VARIMATIC®

The SUPER SENSITIVE, SMALL-HOLE, PRECISION DRILLING MACHINE

With capacity of .004" to 5/16" in *all* drillable materials, and spindle speeds from 840 to 9300 R.P.M. infinitely variable in two speed ranges . . . *this* is the machine which the precision industries rely upon to handle the "heart-break jobs."

"for the finest work you do"



ALSO . . .

Three companion drills, each built to the same accuracy but differing in drive, speed range, and clearances, to cover the full range of special precision requirements.

AND A TAPPER . . .

with capacity from .034" x 120 to ¼" x 24 . . . and a "reserve of accuracy."

2488

You will want full information about the Hamilton Line of precision drilling and tapping machines. And we will be glad to furnish it.

Ask for our FREE BULLETIN NO. 2488

ADDRESS

THE HAMILTON TOOL COMPANY
832 South Ninth Street
HAMILTON, OHIO

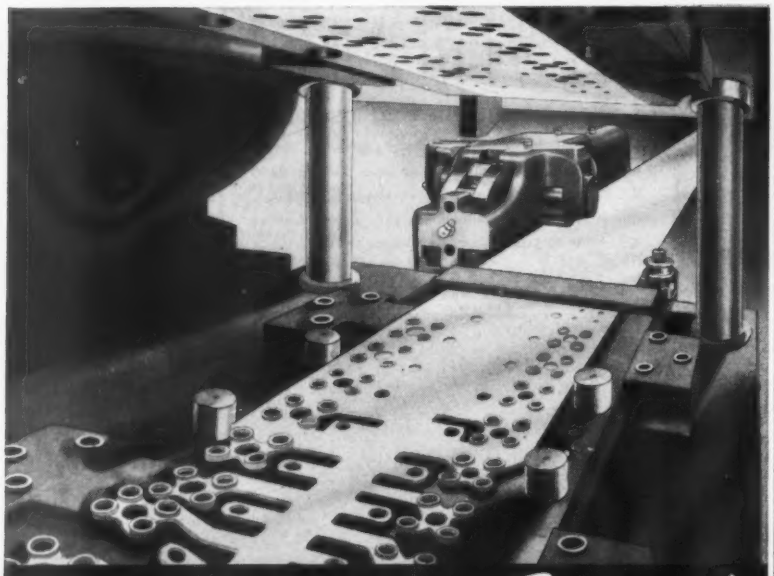
IT'S A Hamilton Tool
USE IT WITH CONFIDENCE

CIRCLE INFORM-A-GRAM KEY NO. 91

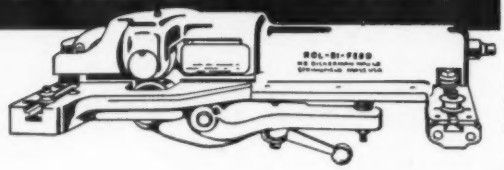
5- and 7½-Ton Platen Arbor Presses are equipped with removable 12" x 12" platens for easy attachment of dies and heated platens. Used for bending, forming, laminating, and broaching, the presses have adjustable power thrust and daylight, 4" or 8" stroke, and 6½" dia non-rotating rams. Van Products Co., 5778 Swanville Rd., Erie, Pa., or — **No. A17.**

2- and 4-Ton Bench Presses perform forming, trimming, and force-fit assembly operations. They bring high ram speeds and adjustable down-stroke control to the small hydraulic press field, and also extend hydraulic press trimming advantages to producers of small die castings. Machinery Div'n, Hannifin Co., Des Plaines, Ill., or — **No. A18.**

Dickerman Feeds *Present...*



A Press-Eye View of Precision!



Hour after hour, day after day, Dickerman Press Feeds feed more presses, for more production, more profits!

A standard "off-the-shelf" feed, at a fraction of the cost of special feeds, can solve the problem of speed, accuracy and dependability and pay for itself in days. Every one of the 14 models is press-room proved on thousands of different and unusual applications.

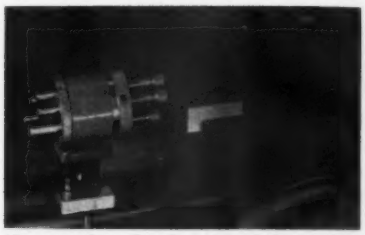
Dickerman

H. E. DICKERMAN MFG. CO.
321-415 Albany St. • Springfield, Mass.

Send for information on the complete Dickerman "standard" Press Feed line — experience unlimited versatility.

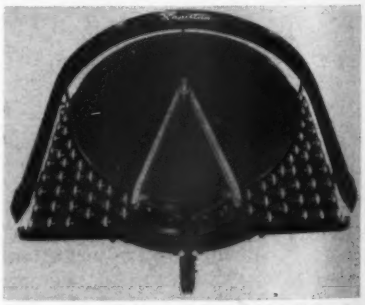
CIRCLE INFORM-A-GRAM KEY NO. 92

Reduce Rejects caused by slippage of the lathe carriage stop on the shaft using the device offered by G/K Products, 9548 Gidley St., Rosemead 77, Calif. This stop provides positive cutting depth control for lathes in any of 6 pre-selected positions and a lock holds the stop firmly in place, yet prevents dimpling of the stop. **Circle Inform-A-Gram No. A19.**



A Nickel-Base Hard-Facing Powder containing tungsten carbide and chromium borides is recommended for use with the Sprayweld process in applications requiring exceptional resistance to abrasion or to combined abrasion and galling. Colmonoy 75 saves wear particularly on cylindrical parts. Wall Colmonoy Corp., 19345 John R St., Detroit 3, or—**Circle Inform-A-Gram No. A20.**

Effect 180° Transfer Between Parallel, Adjacent Horizontal Power Units with the improved power turntable. Available in 4', 5', and 6' dia, it can also be used between floor to floor conveyors. For information write Rapids-Standard Co., Inc., 342 Rapistan Bldg., Grand Rapids 2, or **Circle Inform-A-Gram No. A21.**



Specify **RING PUNCHES AND DIES**

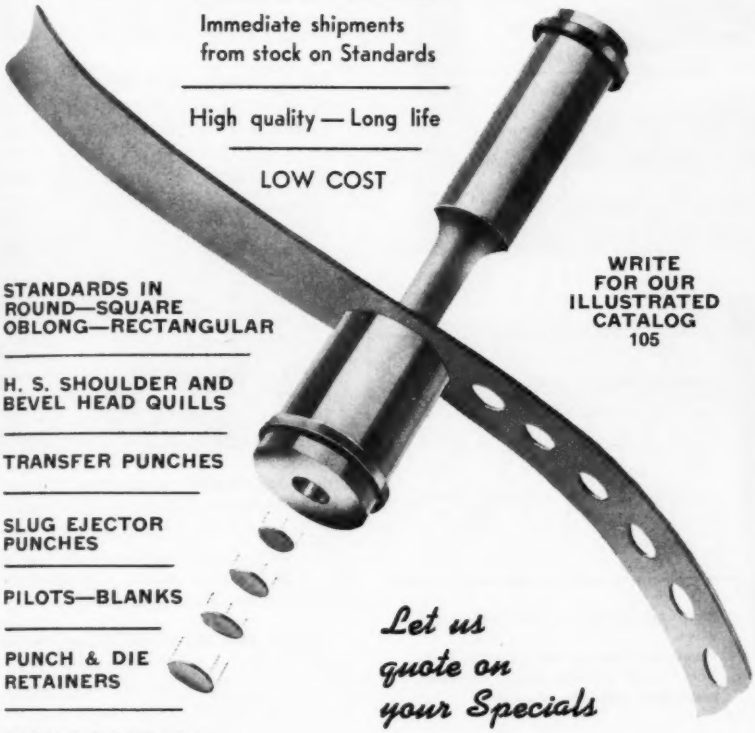
for your perforating problems

Complete interchangeability

Immediate shipments from stock on Standards

High quality — Long life

LOW COST



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STANDARDS IN ROUND—SQUARE OBLONG—RECTANGULAR

H. S. SHOULDER AND BEVEL HEAD QUILLS

TRANSFER PUNCHES

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PILOTS—BLANKS

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Let us quote on your Specials

Send prints or sketches for prompt reply.

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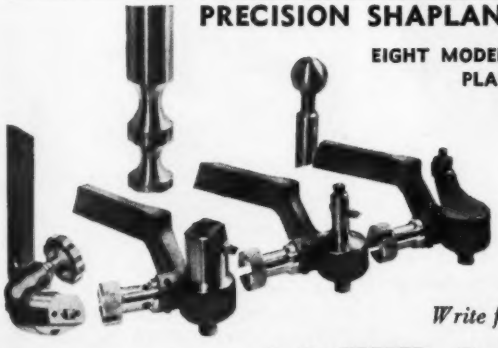
FENTON PLACE JAMESTOWN, NEW YORK

CIRCLE INFORM-A-GRAM KEY NO. 931

PRECISION SHAPLANE RADIUS TOOLS

EIGHT MODELS FOR LATHES, SHAPERS, PLANERS AND BORING MILLS



Range: 3/8" to 3" for concave radii on lathes. Two sizes for convex radii (Balls up to 2½" dia.) on lathes. Also heavy duty model for radii to 6" on planers, etc.

Write for circular

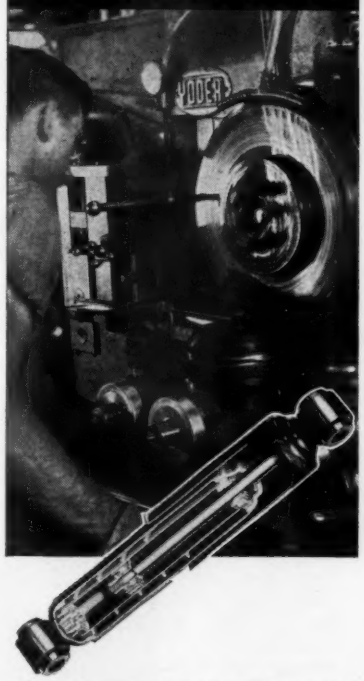
Patent Pending

C. B. TEETER - Tool Room Specialties

1221 W. Addison St., Chicago 13, Illinois • Phone DRexel 3-3571

CIRCLE INFORM-A-GRAM KEY NO. 932

Monroe Shock Absorbers rely on Precision Performance of YODER TUBE MILLS



After 15 years of continuous operation the Yoder Type-M Electric-Resistance Weld Tube Mill shown here, is still producing precision tubing for the Monroe Auto Equipment Co., Monroe, Michigan.

Yoder produced tubing is the basic component of the famous "Monro-Matic" shock absorber. Measuring 2 1/64" outside diameter (plus several other sizes) the tubing is made from 22 gauge strip in one continuous operation . . . it is automatically cold-roll formed, welded and cut to pre-determined lengths.

This typical installation of a Yoder tube mill exemplifies the accuracy, dependability and production economies of Yoder-made tubing. If your business requires pipe or tubing, ferrous or non-ferrous, in sizes from ¼" to 26" diameters, there is a Yoder mill designed to produce it economically, efficiently and accurately.

THE YODER COMPANY

5501 Walworth Ave. • Cleveland 2, Ohio

Check into the many cost-saving advantages of operating a Yoder pipe or tube mill . . . write for the fully-illustrated 88-page Yoder Tube Mill Book . . . it is yours for the asking.

ENGINEERING YODER MANUFACTURING

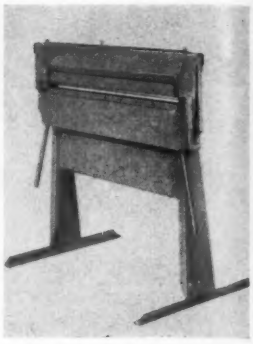
PIPE AND TUBE MILLS

(ferrous or non-ferrous)

CIRCLE INFORM-A-GRAM KEY NO. 933

A New Clutch Design on the Torqomatic Tapping Head has straight line action which offers a 100% driving surface. This increases power, and provides sensitive, rapid response to light pressure on the drill press lever. Tapping accuracy and longer clutch life are possible. Jarvis Corp., Middletown, Conn., or — **Circle No. A22.**

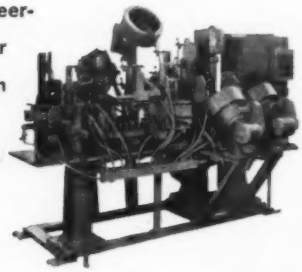
Portable or Bench Mounted 180° Sheet Metal Brakes permit fast, easy forming and bending of sheet metal parts in 20-ga to 16-ga sheets from 26" to 36" wide. They will form around the inside of an opening, double seam plenum caps, and make radius bends to ½". R. E. Smith Mfg. Co., 1122 Elizabeth St., Waukegan, Ill., or **Circle No. A23.**



Part: Carburetor economizer diaphragm valve.
Operation: Gaskets and diaphragm cut from reel stock. Seven parts assembled.
Production: 900 valves per hour.

83% labor savings with automated assembly!

Can you automate your assembly operation economically? Gray's engineering staff is best equipped to answer your question. Design, manufacture, installation and initial operation of automated assembly equipment is our only business.

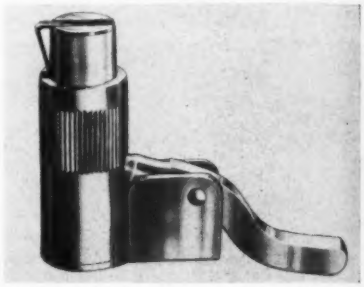


Write for our 24 page bulletin, "Automated Assembly."

gem **GRAY equipment company**
13600 Ford Road • Dearborn, Mich. • Telephone: Tiffany 6-7573

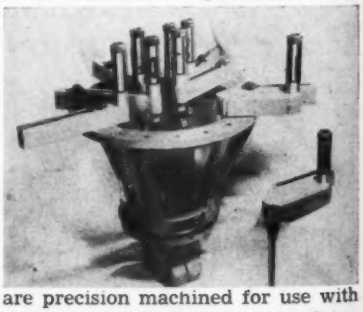
CIRCLE INFORM-A-GRAM KEY NO. 94

An Automatic Die Stop for stopping material just prior to the piercing, shearing, or blanking operations does not depend on a loose fit in order to function properly, and provides a rigid gaging surface. Simply drill and ream a hole in the proper location and press the stop in position. Keystone Engineering & Mfg. Co., 122 S. W. 16th St., Des Moines, Iowa, or — **Circle No. A24.**



Check and Measure Large Work with a 20" model sine block announced by Taft-Peirce, Woonsocket, R. I. Model 9118-20 combines the features of the 20" sine bar with a right angle iron. Work may be easily clamped to block by using tapped holes which are available on all working surfaces. **Circle No. A25.**

A New Extension Spindle Bracket Assembly for use with the line of Thriftmaster universal joint type drillheads provides a 4⅛" extension of the maximum adjustment. They are precision machined for use with jig bored spindle locating templates. For information, write Thriftmaster Products Corp., 1012A N. Plum St., Lancaster, Pa., or — **Circle No. A26.**



for as little as $22.00 COMPLETE IN U.S.A

For This Production Boosting

"TRICO-MIST" COOLANT SYSTEM

With Flexible Armored Coolant Lines And Kwik-Change Nozzle.

For drilling, tapping, milling, sawing, grinding, etc. Removes heat from cutting edges of tools and work. Feeds can be increased considerably, finer finishes and accuracy are obtained. TRICO-MIST absorbs heat, thereby quenching it faster than flood coolants which only transfer it. Chips slide freely up the tool face and are blown away automatically. Simple needle valve controls size and volume of mist spray. Attaches to shop air line. Available with one and five gallon containers — single or multiple outlets — single or dual valve control.

SEND FOR BUL. No. 37

TRICO FUSE MFG. CO.
MILWAUKEE, WIS. U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 951

.0003 HOLE LOCATION IN 1 MINUTE

EDGE FINDERS

$2.50 NEW — POSTPAID except C.O.D. — $10.00 DELUXE

- THOUSANDS HAVE PROVEN AND ACCEPTED THE DELUXE MODEL FOR YEARS.
- JUMPS SIDEWAYS AS SHOWN WHEN LOCATION IS REACHED.
- NEW .500 DIA. MODEL FOR LARGER WORK ONLY.

.200 Dia.

ADJUSTABLE VISE STOP

$2.95

HUNDREDS OF PIECES TO A .0003 TOLERANCE WITH THIS HARDENED VISE STOP THAT IS ADJUSTABLE IN ALL DIRECTIONS. ATTACH TO VISE WITH ONE ¼—20 TAPED HOLE.

GLOVER MFG. CO.
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KUTMORE ADJUSTABLE HOLLOW MILLS

- Any COMBINATION of . . . Turning . . . Tapering . . . Facing . . . Chamfering . . . Trepanning in ONE PASS.
- Exclusive MICROMETER Adjustment Feature For Rapid Set-Up.
- Area Sales engineers for your immediate Problems.

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PRECISION STARTS HERE

CARL WIRTH & SON, INC.
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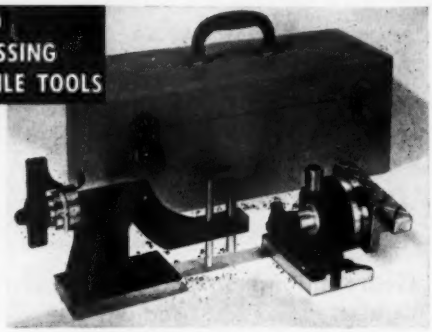
Now ANGLE TANGENT TO RADIUS WHEEL DRESSING WITH NEW VERSATILE TOOLS

MIGHTY GOOD AT ANY PRICE BUT TOPS AT ONLY $149.50
(Both tools including diamonds)

The G-5 RADIUS DRESSER is a precision engineered tool that will dress either a convex or a concave radius from .015" to 1.750" on a 7 inch or 10 inch wheel, and it may be set to the exact radii desired. Graduated stops allow you to dress any desired portion of a radius. The spring tension journal insures chatter free operation. The G-2 ANGLE DRESSER AND TOOL HOLDER is actually two tools in one, having an easy to read vernier scale 0° to 180° giving accuracy within 2" of 1°; an excellent time saver to set up small jobs to be milled, drilled, tapped, etc., on any desired angle.



Our fixtures will dress most radii and angles tangent to each other, similar to those shown below.

FREE handsome, wooden storage box. Write for complete information.

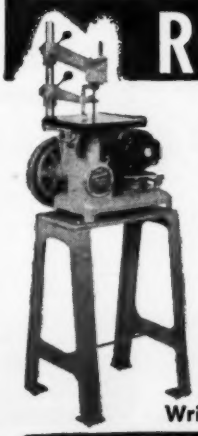
Distributorship available in select territories.

ROTH FUSS TOOL COMPANY
BOX 2695, ELMWOOD STATION PROVIDENCE 7, R. I.

CIRCLE INFORM-A-GRAM KEY NO. 954

Smoother Production! Higher Output! Lower Costs!

RICE-MILWAUKEE



DIE FILERS . . . for straight-line sharp corner filing, sawing and lapping.

This low cost precision-built unit performs all die making operations at savings up to 40%. Furnished complete with motor and two overarms. No extras to buy.

PROFILE GRINDERS

. . . for high speed Precision Grinding of Curved and Irregular Contours.

Standard features include 20,000 or 30,000 R.P.M., or a combination of these spindle speeds, ½ H.P. motor, Collet Chuck, Compound tilting table, built-in wheel dresser.

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RICE PUMP & MACHINE COMPANY
228 PARK AVENUE BELGIUM, WISCONSIN

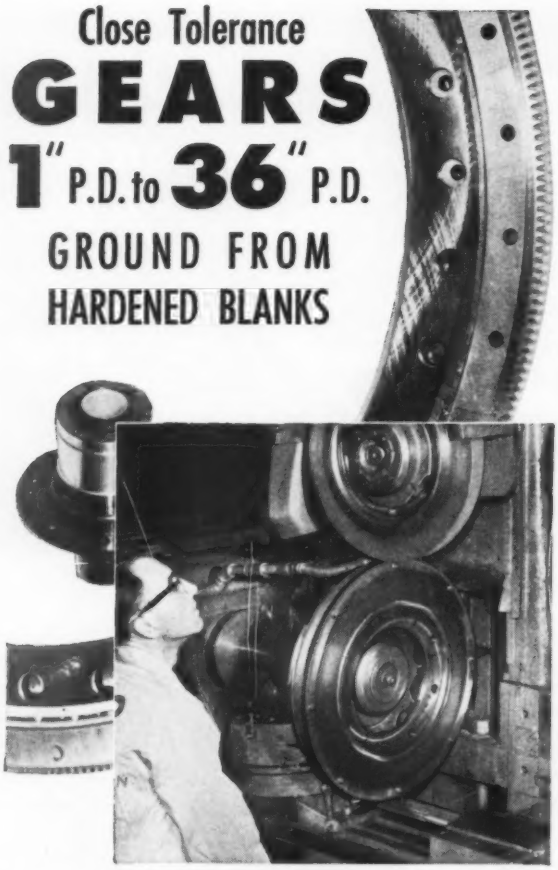
CIRCLE INFORM-A-GRAM KEY NO. 955

Close Tolerance

GEARS

1" P.D. to 36" P.D.

GROUND FROM HARDENED BLANKS



Gears ground on gear grinding machines designed, made and used only by Vinco, have an accuracy of tooth form, tooth space and a high quality of finish seldom equaled. These fine gears have been meeting the exacting requirements for jet engines, radar equipment, guided missiles and instruments for many years. This proven performance and experience is your assurance that Vinco ground gears will equal or better specified tolerances and fulfill performance requirements.

These highly accurate gears can be produced in pitches ranging from the coarsest to 240 and in quantities from one to multiple thousands.

Master Gears

Vinco master gears provide the most accurate means for checking the rolling action of production gears. Vinco produces extremely accurate master helical (spiral), spur gears and master worms.

VINCO CORP.

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Detroit 28, Michigan

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HAVE YOU CHECKED YOUR COUNTERSINKING COSTS LATELY?
A Severance CARBIDE ECONO-SINK WILL GIVE YOU —
INCREASED ACCURACY
MORE PRODUCTION
LESS DOWN-TIME
SMOOTHER SEATS
AND A COMPLIMENT FROM THE BOSS FOR SUGGESTING THE CHANGE
LONGER CONSISTENCY OF OPERATION
Chatter-Free DESIGN
Solid CARBIDE CUTTING HEADS
MAKE THE Switch to Carbide BEFORE IT'S TOO LATE
WITH THE NEW Severance CARBIDE ECONO-SINK YOU GAIN ALL THE ADVANTAGES OF CARBIDE TOOLING - AND AT LESS COST per Countersunk Hole
Ask for Information & Prices TODAY!
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INSIDE DEBURRING CUTTERS
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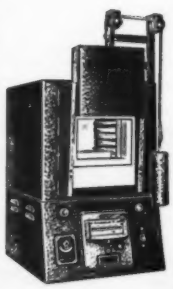
HAND DEBURRING CUTTERS
TUBE END DEBURRING CUTTERS
CARBIDE HAND FILES
SPECIAL CUTTERS
MICRO-MILLS & BORE-MILLS
BALL SEAT REAMERS

CIRCLE INFORM-A-GRAM KEY NO. 962



Request literature on complete line of Huppert furnaces and ovens.

Be sure of Maximum Heat Treating Efficiency with

HUPPERT FURNACES

- Range: 300° F. to 2000° F.
- High temperature, heavy-duty Kanthal elements
- Multi-insulation
- Counter-weighted, tight-sealing door
- Operational pilot light
- Shipped ready to operate

Model No.	Inside Dimensions			KW	Prices 220 Volt Single Phase	
	Wide	High	Deep		With Huppert Input Controller	With Electronic Temp. Controller
869	8"	6"	9"	4	$296.00	$480.00
11*	8"	6"	12"	4	306.00	518.00
12*	8"	8"	12"	6	382.00	590.00
12A*	8"	8"	18"	9	490.00	698.00

*For 2300° F. add $95.00 to No. 11 and No. 12, and $105.00 to No. 12A. No. 12A can be furnished for 3 phase at no additional cost. For floor model add $52.00 to above prices. No. 869 standardly supplied for 2200°F.

K. H. HUPPERT CO.

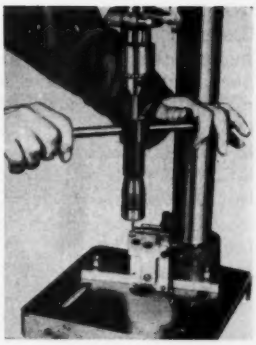
Manufacturers of Electric Furnaces and Ovens

6820 Cottage Grove Ave., Chicago 37, Illinois

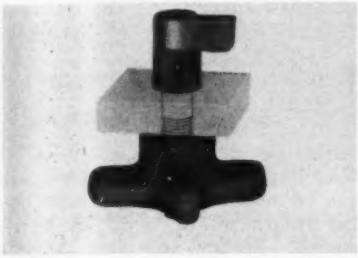
CIRCLE INFORM-A-GRAM KEY NO. 963

An Electric Arc Metal Disintegrator is best suited for salvage work such as removing broken taps and studs, and drilling curved and other odd-shaped holes in very hard metals. Model C-66 has its own pumping system and is used in conjunction with drill presses, etc. Cammann Mfg. Co., Inc., 2700 Henninger Rd., Cleveland 9, or — **No. A27.**

A Simple, Inexpensive Hand Tapping Device produces precision threads from No. 0 to ½". To be used with drill presses, lathes, jig borers, and vertical millers, this tapper eliminates the need for individual hand tapping machines and devices. The Grimes Engineering Corp., 1187 College Hwy., Cheshire, Conn., or — **Circle No. A31.**



A New "L" Lock Clamp is manufactured by West Point Mfg. Co., 26935 W. 7 Mile Rd., Detroit 19. This "L" lock clamp meets the need for



holding parts inside a fixture which is controlled from the outside. Write to the company for information, or — **Circle No. A28.**

Lower Hand Scraping Costs Using Bearing Blue Compound which locates the high spots for hand scraping or fitting of all bearings and sur-

faces. It spreads evenly and does not dry out. Write to Dayton Rogers Mfg. Co., Minneapolis 7, for your free sample, or — **Circle No. A29.**

Long Service Life with non-galling feed action provides more economical and efficient bar stock feeding with the carbide-faced feed finger

pads for single and multiple spindle screw machines. The Carpads have a heat treated backing which prevents breakage. For information, write Corlett-Turner Co., 9145 King St., Franklin Park, Ill., or — **A30.**

ARE YOU USING- HOVIS UNIVERSAL Master COMPOUND DIES

to Produce WASHERS and SMALL STAMPINGS from all Types of Materials the ECONOMICAL WAY?

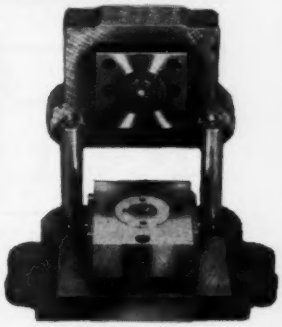
SAVES

DESIGNING COST
TIME • LABOR
MATERIALS
STORAGE SPACE

The "MODERN METHOD" adopted by MANUFACTURERS NATIONALLY

NO NEED TO MAKE A NEW DIE FOR EVERY STAMPED PART

● By simply removing and replacing five, small, interchangeable inserts a new part may be produced . . . This method makes possible all production including irregularly shaped pieces and shallow draws.



Made in 5 sizes:
¾" - 1½" - 2½" - 4" - 6"

Specialists in designing and manufacturing MULTI-DIES as well as supplying COMPLETE TOOLING FOR ALL SIZES OF NUT FORMERS

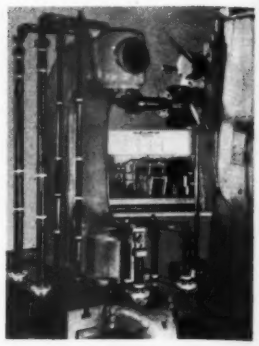
HOVIS SCREWLOCK COMPANY

8100 E. NINE MILE ROAD • BOX G • WARREN, MICHIGAN
Phone: Slocum 7-4800 Suburb of Detroit

CIRCLE INFORM-A-GRAM KEY NO. 118
CIRCLE INFORM-A-GRAM KEY NO. 97

A New Ultrasonic Drill is designed for the rapid drilling of intricate shapes into hard and unyielding materials such as carbide. The Glennite U-602 can be used for lapidary work, trepanning, and in the manufacture of electronic components. Gulton Industries, Inc., 212 Durham Ave., Metuchen, N. J., or — **A32.**

Clamp Work of any size onto machine tool slotted tables, bolster plates, or angle plates using a kit having all necessary pieces. The Hi-Lo clamp kit is available in boring mill and milling machine sizes, and includes U clamps, adjustable bolt assemblies, and tee nuts. Hi-Lo Products Co., 8817 Lyndon Ave., Detroit 38, or **Circle No. A33.**

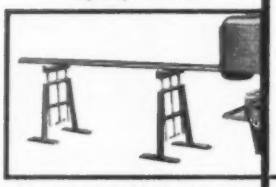


Model B (Wet or Dry) Dependable. Economical. Easily handles 5" rounds, 10" flats.

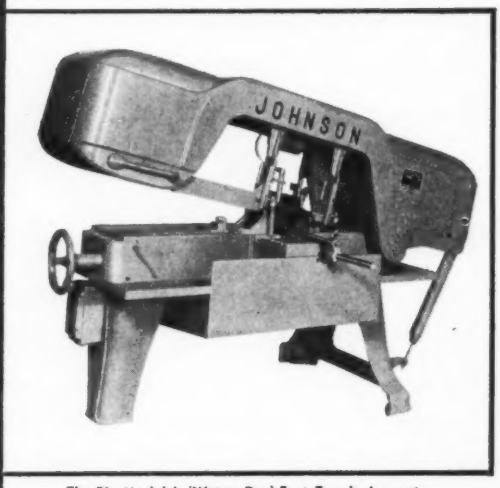
Johnson

Speaks for itself in ANY SHOP!

Model M (Mobile). Rolls to the job, inside or out. Capacity: 5" x 10"



Johnson Adjustable Stock Stand. Provides rigid, safe work support.



The Big Model J. (Wet or Dry) Fast. Tough. Accurate. Capacity: 10" rounds, 18" flats

The big, dependable Johnson delivers more saw for less money. It easily and accurately handles anything in your stock pile: rods, angles, tubes, heavy rounds, irregular shapes, and flats.

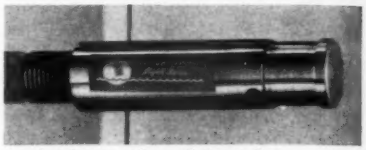
Whatever model fits your production requirements, you'll find Johnson versatility will boost your production and lower your metal cutting costs. Today, the Johnson saw speaks for itself in thousands of progressive shops . . . *why not yours?*

Johnson MANUFACTURING CORPORATION
1017 BARNES STREET, ALBION, MICHIGAN

Eastern Distributor	*Mid-Western Distributor*	*Western Distributor*
R. J. R. KELLY CO.	**W. Q. LUNDMARK**	**HASTINGS DISTRIBUTORS**
Hale Bldg., 51 Main St. East Orange, N. J.	75 N. Broadway Des Plaines, Ill.	1605 Solano Avenue Berkeley, Calif.

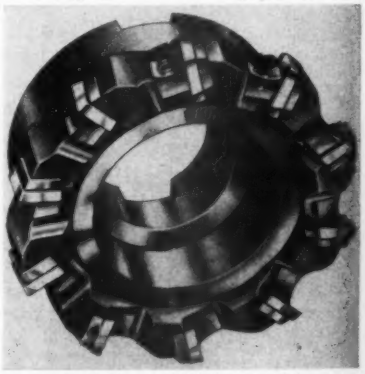
CIRCLE INFORM-A-GRAM KEY NO. 98

A Liquid Spring Shok with time delayed return using liquid compressibility has been announced by Taylor Devices, Inc., 188 Main St., N. Tonawanda, N. Y. The standard



model has a time delay of 1 sec, but can be modified to provide time delay return up to ½ hr on a ½" stroke. Energy absorption adjustable up to 98% of the input and sizes up to 44,000 in-lbs are available. **Circle Inform-A-Gram No. A34.**

High Feed Rates, generous chip room, and close blade spacing are features of the positive rake inserted blade shell end mills and face mills, utilizing ½" and ¾" square throw-



away carbide and high speed inserts. They are produced with positive radial and positive axial rake angles. For information, write The Viking Tool Co., 1000 Nichols Rd., P. O. Box 471, Shelton, Conn., or — **No. A35.**

Apply Fast Drying Marking Dye to surfaces with the Dykem fountain brush. A soft-hair brush with a hollow handle is attached to a squeezable translucent bulb joined to a screw-cap of a non-breakable bottle. No re-dipping is necessary. For information, write to The Dykem Co., N. 11th St., St. Louis, or — **No. A36.**

EQUIP FOR THE SIZE OF THE JOB

DRILL MICRO-HOLES

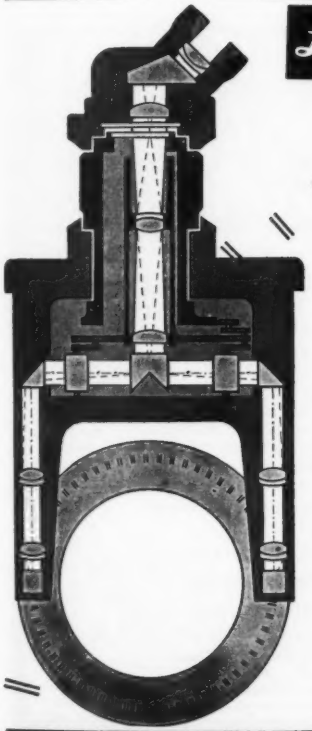
DOWN TO .0016" with SPEED & ACCURACY

ON *LEVIN* INSTRUMENT LATHES

The Levin micro-drilling equipment shown here can be used with the smallest drills available. It is designed so that the drilling does not depend on the operator's sense of feel. The drill can be retracted for chip removal and returned to the drilling position without striking the bottom of the hole. While commercial drills can be had as small as .0016" this micro-drilling apparatus has successfully produced holes as small as .0006". **Send for catalog M describing complete line of instrument lathes and accessories. Louis Levin & Son, Inc., 3610 S. Broadway, Los Angeles 7, California.**

CIRCLE INFORM-A-GRAM KEY NO. 991

Leitz



ULTRA PRECISION IN SPACING

on guided missile components and similar critical work guaranteed by this exclusive DOUBLE-MICROSCOPIC PICK-UP of the LEITZ OPTICAL MASTER DIVIDING HEAD.

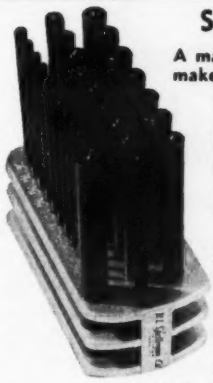
It compensates for run-out, the most common source of error. Working accuracy 1 second of arc.

There is no substitute for LEITZ in optical dividing.

Request catalog 82-1

OPTO-METRIC TOOLS, INC.
137-TP VARICK STREET, NEW YORK 13, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 992



SPELLMACO SPOTTERS

A matched set of transfer punches for toolmakers, machinists and tool cribs.

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel carefully heat treated and tempered for long life. .0025 undersize to facilitate use—black oxide finish.

Set No. 3-17: 28 punches with indexed stand—sizes 3/32" to ½" by 1/64" plus hand 17/32" size—length 4⅞". PRICE only $17.90

Single size available.

R. L. SPELLMAN CO. • Urbana, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 993

NOW GET CLEAN SURFACED PARTS FROM YOUR AUTOMATICS . . . *UNMARRED* BY TOOL WITHDRAWAL MARKS

THE NEW **RELIEVOMATIC**
SELF-RELIEVING TOOL HOLDER

SAVES YOU COSTLY SECONDARY FINISHING OPERATIONS

Avoid scratches like this — All clear with "Relievomatic!"

Easily installed on cross-slide or turret

Write today for details.

SILBER PRODUCTS, INC. Nightingale 9-8600
870 Essex Street • Brooklyn 8, N. Y.

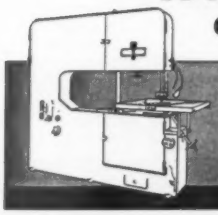
CIRCLE INFORM-A-GRAM KEY NO. 994

FRICTION SAWING with Tannewitz HIGH SPEED BAND SAWS

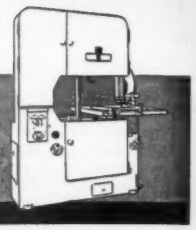
FASTEST, BEST MEANS OF CUTTING METALS

If you are not familiar with the advantages of friction sawing with these machines, by all means drop us a line asking for "Friction Sawing Data." You can save many times the cost of a Tannewitz High Speed Band Saw and greatly expedite production by using it to cut sheets of both hard and soft steel, formed or flat, trimming malleable and steel castings, cutting armor plate or many other materials. Write NOW!

THE TANNEWITZ WORKS
GRAND RAPIDS, MICHIGAN ☎ GL-6-1729



TANNEWITZ DI-SAWS — 24", 36", 48", 60" CAPACITIES
for CONTOUR SAWING, FILING, POLISHING
The smoothest, fastest, most trouble-free Di-Saws on the market. Write for bulletin.



CIRCLE INFORM-A-GRAM KEY NO. 1001

CON-CHEK®

- A New Type Hole Relation Gage.
- The finest Hole Relation Gage available.
- It's an instrument of the highest precision.
- Read the indicator directly, without turning either your hand, or the gage handle.
- The knurled thumb-knob rotates the extension spindle.
- As the outer shaft of the pilot remains stationary, wear is greatly reduced.
- Indicator and dial setting completely protected.
- Every CON-CHEK hardened and ground, with chromed pilot and hardened gage pins.
- CON-CHEK is available in a full range of models, made up of stock components.

Write for literature.

engineers and builders of special machines, tools and gages

Mayes Tool Co.

26514 W. Seven Mile Road • Detroit 40, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 1002

AT LAST — DURABLE, SIMPLE
QUICK TO INSTALL
DIE STOPS!

Automatic Stop

Cut-Off Stop

Ruggedly constructed for long dependable service, KEYSTONE STOPS are *simple to install*. In fact, an apprentice can install any of them within 15 minutes. Designed by a die maker to solve time consuming die stop problems, they have been brutally tested and prove to be the finest stops available.

See for yourself. Discover that you can combine quick installation with extra long wear!

Retractable Spring Stop

Write for full information and the name of your nearest Keystone distributor.

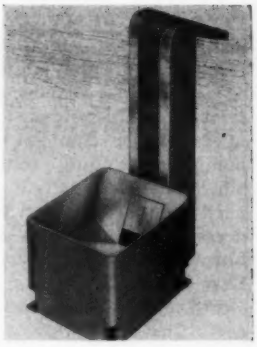
Primary Stop

KEYSTONE ENGINEERING & MFG. CO.
BOX 1341 • DES MOINES, IOWA

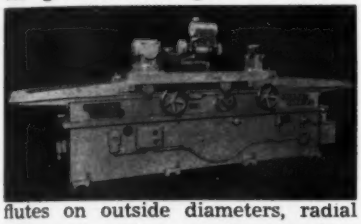
CIRCLE INFORM-A-GRAM KEY NO. 1003

Replaceable Metal Bowl Filters offer improved filtering efficiency for ¾" to 1" air line where temperatures reach 200°F and 300° F or where pressures go as high as 250 psi. Furnished with either automatic or manual drain, the bowl filters have the Norgren directional louver. C. A. Norgren Co., 3400 S. Elati St., Englewood, Colo., or — **Circle No. A37.**

A Vertical Elevating Conveyor features floor level loading to avoid highlift hopper filling and to give gentler parts handling. Self-cleaning cleats virtually eliminate slow downs due to snarling or nesting of parts. Capacity is about 5 cu ft. Vibratory Feeder Co., Automation Devices, Inc., Erie, Pa., or — **Circle No. A41.**



Heavy Milling Cutter Assemblies up to 1000 lbs can be sharpened in arbor on this universal tool and cutter grinder. Straight and helical

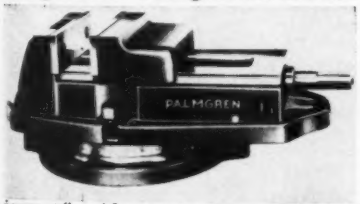


flutes on outside diameters, radial faces and end faces can be ground on the machine. Colonial-Romulus Div'n, Colonial Broach and Machine Co., Parkgrove Sta., Detroit 5, or — **Circle Inform-A-Gram No. A38.**

Use Die-Molded Polyester Fibreglas Trays for high temperature and corrosive materials handling applications. They are dimensionally stable under humid conditions or

when used at temperatures ranging from 45° to 225°. The trays are 14" x 11" x 4" and come with lids. National Vulcanized Fibre Co., 1058 Beech St., Wilmington 99, Del., or — **Circle Inform-A-Gram No. A39.**

A Flanged Milling Machine Vise with swivel base is for heavy-duty service on milling machines, shapers, planers, drill presses, radial drills, and grinders. Palmgren No. 80B has

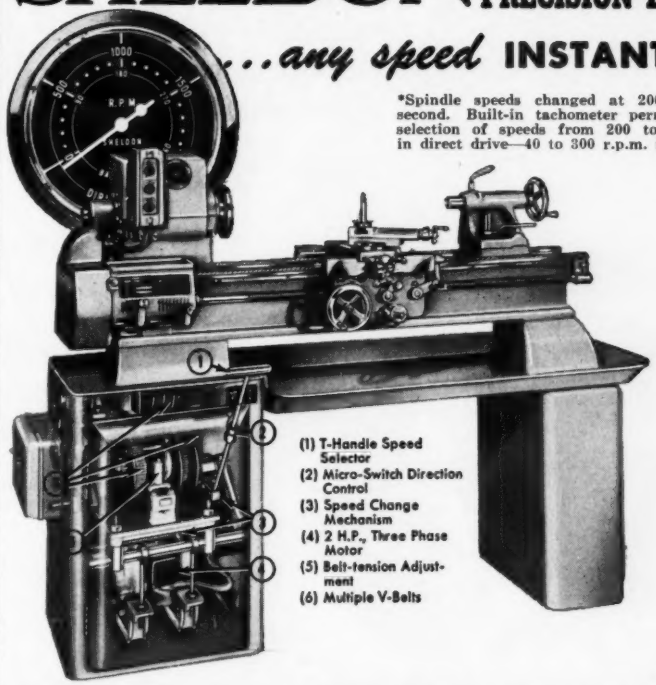


jaws 8" wide, opens 8", and has a jaw depth of 2½". For information, write Chicago Tool and Engineering Co., 8383 S. Chicago Ave., Chicago 17, or — **Circle No. A40.**

SHELDON *Variable Speed* PRECISION LATHES

...any speed INSTANTLY *

*Spindle speeds changed at 200 r.p.m. per second. Built-in tachometer permits accurate selection of speeds from 200 to 2000 r.p.m. in direct drive—40 to 300 r.p.m. in back gear.


(1) T-Handle Speed Selector
(2) Micro-Switch Direction Control
(3) Speed Change Mechanism
(4) 2 H.P., Three Phase Motor
(5) Belt-tension Adjustment
(6) Multiple V-Belts

This new lathe instantly meets every changing speed requirement in the tool room, or quickly sets and holds to any prescribed speed for production runs.

Rugged, Heavy-duty Variable Speed Drive—an oversized unit with double V-belts throughout that delivers positive full-power to the spindle.

High Spindle Speeds — from 200 r.p.m. to 2000 r.p.m. (direct drive), from 40 r.p.m. to 300 r.p.m. in back gear.

Instant and Automatic (power driven) Speed Selection—Only 9 seconds to change from low to high speeds in either direct drive or backgear. Speeds are changed automatically when T-handle is lifted or pushed into engagement.

High Horsepower at All Speeds—Because the drive unit is oversized, it has larger belts which deliver maximum gripping power at all speeds. A 2 H.P., three Phase motor recommended.

Additional lathe features: Zero Precision tapered roller spindle bearings, 54 pitch gear box, heavy cast pedestal, tool-room accuracy. Optional accessories include hardened bed ways, L00 long taper key drive or 4" D1 Camlock spindles.

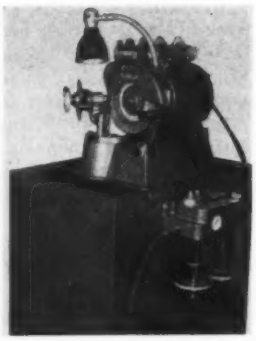
Sheldon Precision Variable Speed Drive Lathes are available in 11" or 13" Swing. Model WM-56-P (Illustrated) less motor and switch, $1,944.00 F.O.B. Chicago. Other 10", 11", and 13" Sheldon Precision Lathes from $898.00 up. Also 13" and 15" Sebastian Geared Head Lathes, Sheldon Milling Machines and Sheldon Shapers.

Write for Catalog

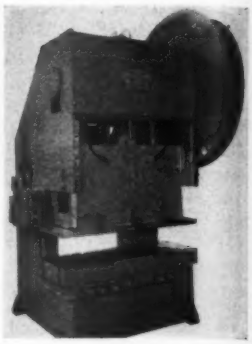
SHELDON MACHINE CO. INC. 4235 N. Knox Ave. • Chicago 41, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 101

Grinding Wheel Life is said to be tripled on drill grinders with the addition of a new mist coolant system. Spraymist directs a jet of cool mist right at the point of grinding contact which helps eliminate the need for frequent wheel dressing, and prevents drill burning. Black Diamond Saw & Machine Works, 125 North Ave., Natick, Mass., or — **Circle No. A42.**



A 150-Ton Double-Crank Open-Back Gap Press was designed for automatic feeds and greater convenience in handling large or irregular sheets. Punching, shearing, forming, and bending of almost any thickness is possible with this series. The Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., Cleveland 14, or — **Circle No. A43.**



Another Buck "First" for You

Buck Gibbed Keyway Ajust-Tru® Power Chuck with Aluminum Body

★ .001″ Precision

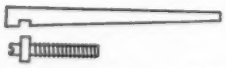
★ Gibs Take Up Wear

★ 40% Weight Saving

★ All Working Surfaces Hardened, Ground, Lubricated

★ All Ajust-Tru Features

★ Available in 6½″, 8¼″, 10″, 12″



Simple, sound, practical! Two tapered gibs under each jaw, working on tapered keyways, can be tightened to preserve original accuracy and eliminate the jaw rocking that develops "bell-mouthing." Jaws are 40% lighter for less centrifugal effect, better gripping at high speeds. One piece hardened front plate eliminates distortion, can be reground in your own shop.

You'll agree when you see it and use it—Buck has made chuck history again with this new gibbed keyway power chuck with aluminum body.

Wear take-up features will *triple* its useful *precision* life, compared with conventional chucks. 40% weight saving increases efficiency and cuts machine wear.

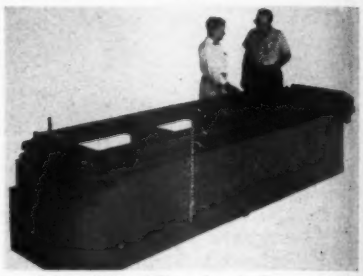
Send for complete details. More than ever—"It pays to chuck with Buck."

BUCK TOOL COMPANY

618 SCHIPPERS LANE • KALAMAZOO, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 102

An Economical Base for Indexing Tooling Applications is the Automator, a standardized chain indexing chassis. Feeding, machining, fastening, inspection, packaging, and ejecting can be accomplished with two



models. The OT series indexes parts carriers around a base frame and the OU series over and under a base frame. Indexes of 1¼″ to 11¼″ in length are possible. Benerson Corp., 1319 W. Florida St., Station A, Box 127, Evansville, Ind., or — **No. A44.**

Machine Aluminum and Light Metal Alloys with a line of inserted high-speed steel blade straddle milling cutters. A double keyway design permits tooth position adjustment on paired cutters for machining different thicknesses of material.

Weaving of thin parts is eliminated because cutter teeth are lined up opposite each other to work simultaneously and act as a wedge. Goddard & Goddard Co., 12280 Burt Rd., Detroit 23, Mich., or — **No. A45.**

INTERVALS BY .001'S AT 50X
GAGE COMPANY Deep-Etch
PRECISION PLASTIC • NON-BREAKABLE
COMPARATOR SCALES
Highly accurate and designed for making quick measurements at scale on projectors and comparaters without any movement of machine or work.
Supplied on Gage Company Precision Plastic . . . a sturdy, non-breakable material of constant stability, .125 in thickness.
Unexcelled as a tool for use in drafting and engineering scale layouts for use on comparators.
Available in all standard magnifications and in several lengths. Various styles for all applications.
WRITE FOR BULLETIN NO. 58-70
GAGE COMPANY
• • • BOX 1080
Battle Creek, Michigan
50X

CIRCLE INFORM-A-GRAM KEY NO. 1031

MAYLINE

A Drafting Table with New Features!

A new Mayline feature — an all steel top covered with Jaspe green linoleum of the proper resilience for drawing. Standard top is Basswood with steel end cleats.

The new May-O-Matic table has a height adjustment mechanism insuring smooth, positive operation. Also an adjustment to counterbalance weight added by lights, drafting machines, and straightedges. This new table is described in Folder S-22. Send for your copy today.

Mayline Company

635 No. Commerce St.

Sheboygan, Wisconsin

MAYLINE

MAYLINE

MAYLINE

CIRCLE INFORM-A-GRAM KEY NO. 1033

BURR-BIT CUTS TAPPING COST WAY DOWN!

Just lock Burr-Bit on any make tap and holes are deburred automatically, leaving a smooth clean chamfer. ONE OPERATION, ONE SETUP, ONE HANDLING.

NEW ADDITION
Now Burr-Bit fits 3 fluted taps from #6 to ½". Also available to fit any tap 2 or 4 fluted from #2 to ¾", as well as heli-coil.

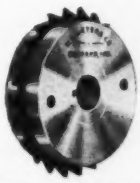
A quality product made of the finest high speed tool steel for use on almost every material.

WRITE now for complete data and reports from engineers who have adapted Burr-Bit and saved on their tapping operations.
INVESTIGATE Burr-Bit-today.

VERNON DEVICES, Inc.
481 E. 3rd Street Mt. Vernon, N.Y. MOunt Vernon 4-1686

CIRCLE INFORM-A-GRAM KEY NO. 1032

PRECISION CUTTERS!



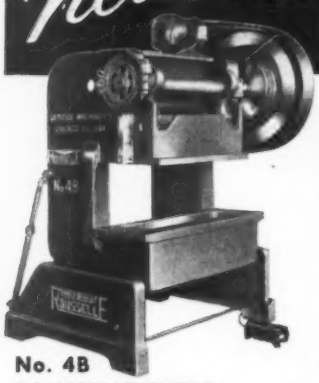
MADE TO YOUR EXACT SPECS . . . SOLID CARBIDE, OR CARBIDE TIPPED!

Why put up with stock cutters, when made-to-order cutters cost no more? Cutters designed for specific gang-milling, slotting, venting, slitting or grooving operations in various diameters and thickness to suit YOUR needs exactly. Fast service: all component materials carried in stock. Top-flight reputation for dependability built since 1888. Furnish complete specs, quantities desired and material to be cut when requesting prices. Write for Bulletin No. 51

W. F. MEYERS CO., INC. BEDFORD, INDIANA

CIRCLE INFORM-A-GRAM KEY NO. 1034

New 40-TON DOUBLE CRANK O. B. I.
ROUSSELLE



WITH NEW ELECTRICALLY CONTROLLED AIR CLUTCH

- "Plug-in" foot and hand controls.
- Single stroke, continuous and jog selector.
- Low air consumption.
- Large die area.
- Roller bearing flywheel.
- Bronze main and crank bearings.

No. 4B ROUSSELLE PRESS

CHOICE OF 30 SIZES AND TYPES IN 5 TO 40-TON PRESSES

SERVICE MACHINE CO.
Mfrs. of Rousselle Presses
2310 WEST 78th STREET • CHICAGO 20, ILL.

ROUSSELLE PRESSES ARE SOLD EXCLUSIVELY THROUGH LEADING MACHINERY DEALERS

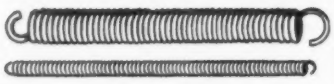
CIRCLE INFORM-A-GRAM KEY NO. 1041

REID TOOL ROOM *Accessories*

COMPRESSION SPRING ASSORTMENT

Made of music wire. Many sizes ranging from 3/32 to 1-½" diameter. All springs 10" long. Select the size wanted and cut to desired length. Low prices. Save time and money.

EXTENSION SPRING ASSORTMENT



Made of music wire. 29 sizes ranging from ⅛" to 1" diameter. All 11" long. Loops or hooks, both ends. Select the size desired and cut to length required. Form loop or hook on cut end.

Quality at Moderate Prices!

WRITE FOR BIG CATALOG

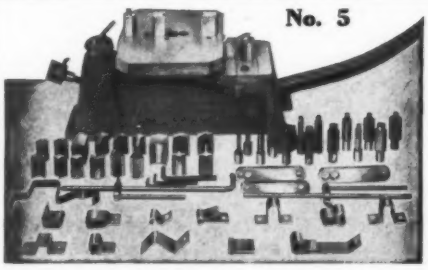
Listing scores of items needed in the tool room such as hand wheels, plastic and steel ball handles, machine handles, hand knobs, etc.

FREE 74 Page Catalog

REID TOOL SUPPLY CO. Muskegon Heights, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 1042

No. 5



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Multiform

BENDER-CUTTER

CUTS, BENDS, PUNCHES

Available in hand, air or hydraulic models. The MULTIFORM is shipped complete with full assortment of dies and mandrels to form and cut round or flat stock up to ⅛" x 1½" as illustrated. Punching dies available. Other models up to ½" x 8" hydraulic operated. Ideal for steel rule die forming.

ALSO AIR OPERATED MODELS

J. A. RICHARDS COMPANY KALAMAZOO, MICH.

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DIXON ONE-MAN COIL GRAB
CUTS TIME AND COSTS WITH ONE-MOTION REEL LOADING

Saves labor and speeds coil handling. One man can lift, turn, and load coil with a single, easy motion. Positive grip and support eliminate coil damage, assure operator safety. Forged steel wedge separates coils easily. Standard sizes up to 15,000 lb. capacity available from stock.

Lifts and turns in one motion.

WRITE FOR COMPLETE DATA—New bulletins illustrate standard models and show how to handle all coil sizes safely, rapidly, without damage. Write for them today.

DIXON AUTOMATIC TOOL, Inc.
2318 -23rd AVENUE
ROCKFORD, ILLINOIS

Equipment for Automatic Parts Handling and Assembly

CIRCLE INFORM-A-GRAM KEY NO. 1044

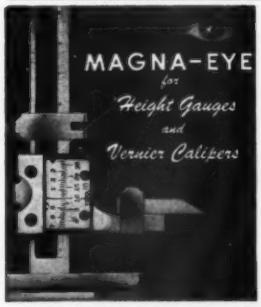
100 USES

PRODUCTO SELF-CENTERING SHAFT VISE

This versatile vise has a hundred uses in your shop. Made for vertical or horizontal mounting, it's ideal for holding shafts or spindles ⅜" to 3⅛" dia. when machining keyways, slots, splines. Design insures accurate radial cuts. Write for detailed bulletin.

THE PRODUCTO MACHINE CO.
970 Housatonic Avenue
Bridgeport 1, Connecticut

CIRCLE INFORM-A-GRAM KEY NO. 1045



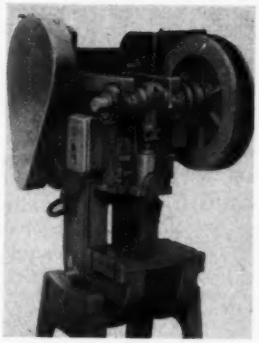
MAGNIFIES "HARD-TO READ" VERNIER SCALES ON HEIGHT GAGES AND CALIPERS

MAGNIFIES the "hard to read" vernier scales on calipers and height gages. No more eye strain, guess work or hit or miss setting and reading. LENS is finest quality optical glass, specially designed and ground for the purpose with utmost optical skill. 4X magnification shows lines true and correct. In daily use in plants of Westinghouse, General Electric, General Motors, Chrysler, Packard, Ford, Boeing Aircraft, Bendix Aviation and many others engaged in defense work.
Made in 3 sizes to fit Starrett, Brown & Sharpe, Lufkin Tools, and others of similar design. 9 No. 100 for 6" Vernier Calipers; 8 No. 200 for 10"-12" Height Gages, also 10"-18"-24" Vernier Calipers; 8 No. 300 for most popular type 18" and 24" Height Gages and for 36"-48" 60" and 72" Calipers.
For Complete Information Write, Phone or Wire

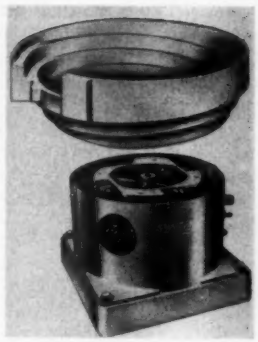
STEBAR COMPANY
215-221 28th Ave. North Minneapolis 11, Minn.

CIRCLE INFORM-A-GRAM KEY NO. 1046

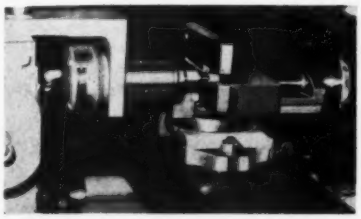
A 15-Ton Slow Speed Punch Press is designed for hand feeding, deep drawing, continuous operation, high accuracy roll, hopper, and dial feeding. A positive gearless system gives quiet operation, and the press operates at from 50 to 150 strokes/min. Kenco Mfg. Co., 5211 Telegraph Rd., Los Angeles 22, or —
Circle No. A46.



Bowl-Type Parts Feeder Components are now available from Syntron Co., 341 Lexington Ave., Homer City, Pa. These components include five standard electromagnetic vibratory drive units and eleven standard sizes of cast aluminum or fabricated steel bowls ranging from 5" to 36" dia in cascade, straight wall, and other styles.
Circle No. A49.

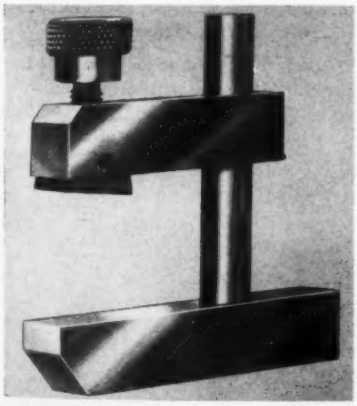


An Air Turbine Grinder, with left hand rotation for mounting on milling machines or machine grinders, can be used for slot and depth grinding, and cutter sharpening. Since the left hand rotation and spindle



rotation are in the same direction, Model DIA-LH can use any standard dust collections setup. Up to ½" dia grinding wheels are used. Onsrud Machine Works, Inc., Portable Tool Div'n 7774 Lehigh Ave., Niles 31, Ill., or —
Circle Inform-A-Gram No. A47.

Speedy Fastening, good holding power, and versatility of application are features of an all-purpose clamp. Used in conjunction with a standard clock gage, the clamp can be used



for inspection of small parts, and it can also serve as a drilling fixture. Extent of jaws is 0 to 3¾" or 1¼". Research Engineering and Sales Co., 1014 Longfellow, Royal Oak, Mich., or—**Circle Inform-A-Gram No. A48.**

Another Engineering First

from TOMKINS-JOHNSON

CHEVRON TYPE ROD PACKING— offers maximum seal, minimum of friction.
SELF-ALIGNING, ADJUSTABLE MASTER SEAL OIL CUSHION (Pat. 2804052)— eliminates ball check, assures fast break-away on return stroke.
PISTON RING CONSTRUCTION— one piece piston provides full wide bearing support and maximum seal under high pressure.
EXTRA LONG ROD GUIDE BEARING— providing ample piston rod guide surface, includes a metallic rod wiper.
SPACE SAVING DESIGN— eliminates tie-rods, gives 360° port rotation, while providing maximum strength.
OVERSIZE PORTS— three types available including Pipe Tap, Flange Fitting or S.A.E. Fitting.
FORGED STEEL HEADS— on all pressure ranges—flame hardened thread area for 3000 P.S.I.

The New

T-J Spacemaker

HIGH PRESSURE HYDRAULIC CYLINDER

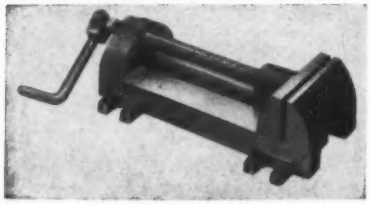
1000
● 2000 **P.S.I. Operating Pressure**
3000

Truly another engineering first from Tomkins-Johnson, the new T-J Spacemaker High Pressure Hydraulic Cylinder will provide quality power performance at high operating pressures. ONLY T-J OFFERS YOU A HYDRAULIC CYLINDER WITH ALL THESE EXTRAS—*STANDARD,* AT NO EXTRA COST. Write to The Tomkins-Johnson Company, 617 N. Mechanic Street, Jackson, Michigan, for further details and Bulletin No. HSM-5-58.

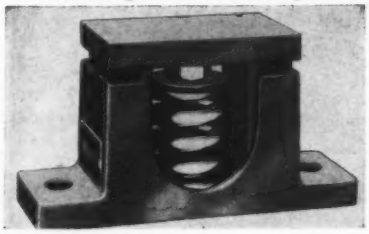
T-J TOMKINS-JOHNSON

CIRCLE INFORM-A-GRAM KEY NO. 105

Many Types of Drill Press Work and other similar operations can be done with the Model X4V vise. Four hold-down feet are provided for easy mounting. Jaws are 4" x 2", with a 7" opening. The handle swivels for easy operation and also enables the operator to swing the handle out of the way. Alva Allen Industries, Machine Tool Div'n, Clinton, Mo., or — **Circle Inform-A-Gram No. A50.**



Cut Machine Installation Time As Much As 50% and maintain machine accuracy using a complete line of low cost spring isolation mounts. Type LO mounting features access port on

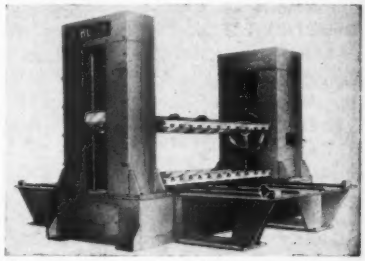


each side of the cast housings which permits interior inspection, and enables changing springs without dismantling the installation. The Korfund Co., Inc., 48-39E 32nd Pl., Long Island City 1, N. Y., or — **No. A51.**

Versatile Boring Quills use throw-away carbide inserts, and each quill is designed to combine operations such as boring, facing, spotfacing, counterboring, and turning. Close

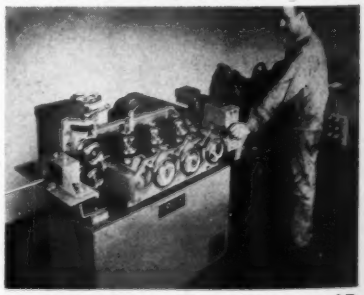
tolerances are held and these tools often can be used on more than one workpiece by changing the insert holders. Wesson Co., 1220 Woodward Heights Blvd., Detroit 20, or — **Circle Inform-A-Gram No. A52.**

A Die Handling Machine safely and quickly manipulates large dies in press room or die shop and can be used either to turn over a die set or to open a set for maintenance.



Open-top construction permits removal of the half die by crane at any point in the operation. For information, write E. W. Bliss Co., 1375 Raff Rd., S.E., Canton 10, Ohio, or — **Circle Inform-A-Gram No. A53.**

Straighten, Cut-to-Length, and Recoil, if necessary, directly from long coils of stock at a high production rate with the Lomatic tube process-



ing line. It handles 3/16" to 1" OD tubes at an output rate of up to 260 fpm. Loma Machine Mfg. Co., Inc., 114 E. 32nd St., New York 16, or — **Circle Inform-A-Gram No. A54.**

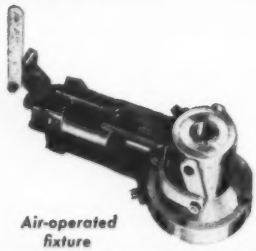
GET A HOLD ON YOUR WORK

Holding-indexing fixture

Holding fixture

Vertical-horizontal fixture

USE ZAGAR COLLET FIXTURES



Air-operated fixture

Collet lathe chuck

The most Effective, Economical, Efficient devices for accurate production

Successful and profit-making for over 15 years, Zagar holding and indexing fixtures step up production and cut your costs. They are *effective* because they hold work rigidly, firmly. They are *economical* because first cost is low, and much costly special tooling can be eliminated. They are *efficient* because set-up is speeded and small part production is a natural. Slot mill, straddle mill, drill, tap, and grind small pieces simply, quickly, and profitably with one of many Zagar collet fixtures—available from stock.

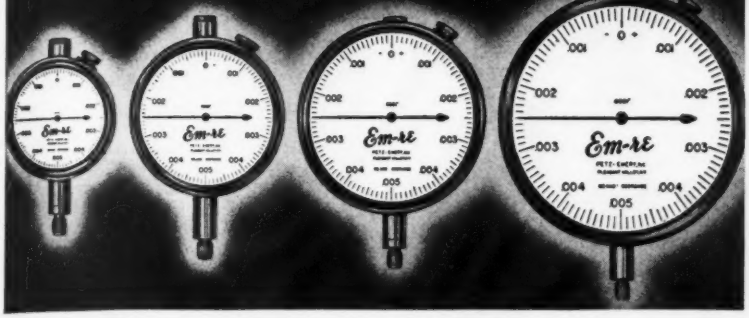
Write for Engineering Data Sheets "T-6"

Zagar

ZAGAR, INCORPORATED
23894 LAKELAND BLVD.
CLEVELAND 23, OHIO

TOOLS FOR INDUSTRY and SPECIAL MACHINERY

NOW Em-re Dial Indicator Accuracy Available In A Complete Line



The unmatched performance of "Em-re" Dial Indicators is now available in a complete line, including all four A.G.D. groups. This new "Em-re" line of 96 different models provides bezel diameters of 1⅝", 2¼", 2¾" and 3⅝"; 9 ranges from .002" to .250"; graduations in .001", .0005", .00025", .0001" and .00005".

In each of these 96 models you'll find the same new standards of accuracy, repeatability and production life that have made other indicators **obsolete.** For example, "Em-re" .0001" models are accurate to within .00002". That's 1/5 of a graduation. And it will repeat through millions of applications. Each "Em-re" indicator is fully jeweled and completely shockproof over the entire range. Of 31 total parts, 26 are common to all "Em-re" models. Send today for literature on "Em-re" indicators.

Patented

PETZ-EMERY INC.

PLEASANT VALLEY, NEW YORK

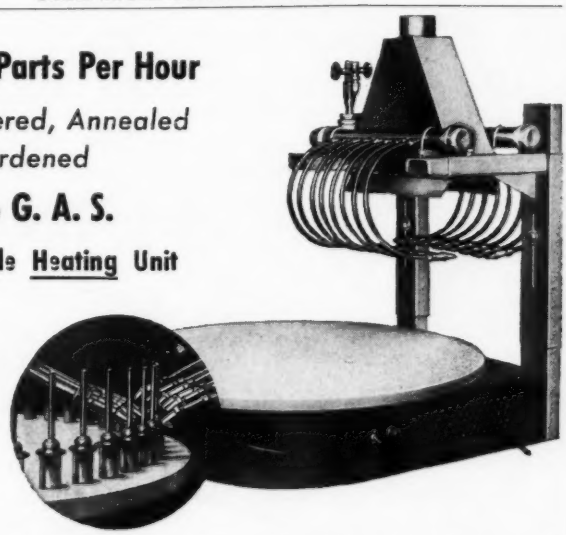
CIRCLE INFORM-A-GRAM KEY NO. 1071

Up to 1,000 Parts Per Hour

Brazed, Soldered, Annealed or Hardened

with the **G. A. S.**

Utility Turntable Heating Unit



Close-up of unit silver-brazing a gasoline drain and feed pipe assembly at a production speed of 450 units per hour.

This high output, low cost unit will heat up to 1,000 parts per hour depending on the size and shape of the part. Then, when you are through with production on one part, in 5 minutes time the unit can be changed over to another — it is just that easy.

Simple fixtures on the transite hold the work. When changeover is required, the transite complete with fixtures, is easily removed and replaced by another complete setup.

The gas manifold with its 16 burners is quickly adjustable horizontally and vertically to suit different parts.

The turntable drive is variable to meet various heat requirements.

This is one of the many versatile, efficient production heating units built by G.A.S. and requires only a small initial investment. Learn how it will answer your production heating problems — write for Bulletin No. 512.

GAS APPLIANCE SERVICE, INC.

Industrial Gas Engineers

1936 Balmoral Avenue Chicago 40, Illinois

REPRESENTATIVES IN MAJOR INDUSTRIAL AREAS

CIRCLE INFORM-A-GRAM KEY NO. 1072

WALTER

PRECISION DIVIDING ROTARY TABLES

With and Without Dividing Discs

- READABILITY: 6 SECONDS.
- CONSTRUCTED FOR LONG LIFE.
- MAINTAIN PRECISION.
- AVAILABLE IN 10", 12½", 15¾", 19¾", 25", 31".

Also many types of Universal Precision Dividing Heads and Attachments for most economical production.

Test reports furnished with literature.

Sole Agents for U.S.A.

KARL A. NEISE

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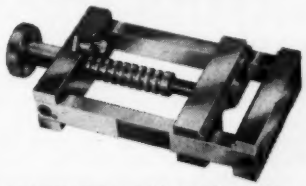
NEISE MODERNTOOLS

CIRCLE INFORM-A-GRAM KEY NO. 1073

ESSENTIAL



PRODUCTO TOOLROOM VISE

Producto's Precision Toolroom Vise is essential equipment for your jig borers, surface grinders, drill presses, tappers. It's extremely strong, yet weighs only 13 lbs. and has a 2" high frame. Has large jaw opening, will clamp heavy as well as light workpieces. All surfaces hardened and ground. Works on five surfaces. Write for Bulletin TE2-103.

THE PRODUCTO MACHINE CO.
970 Housatonic Avenue
Bridgeport 1, Connecticut

CIRCLE INFORM-A-GRAM KEY NO. 1074

CAMS ALL TYPES MADE TO YOUR SPECS

Dr. Chas. Eisler ME, Founder
Chas. Eisler, Jr., Pres.

EISLER ENGINEERING CO., INC.
730 SO. 13TH ST. NEWARK 3, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1075

All Industry relies on . . . LAKESIDE for Heat Treating

You can bet your life that plants who rely on Lakeside for scientific steel treating know what they're doing! They know that no one in this entire area has the modern facilities and the years of metallurgical experience Lakeside has. For your next heat treating job — regardless of size or quantity — call on Lakeside.

OUR SERVICES: Flame Hardening*, Bar Stock Treating and Straightening (mill lengths and sizes), Carbonitriding, Heat Treating, Annealing, Electronic Induction Hardening, Stress Relieving, Normalizing, Carburizing—Pack, Gas or Liquid, Nitriding*, Speed Nitriding, Aerocasing, Chapmanizing*, Cyaniding — Gas or Liquid, Sand Blasting, Liquid Honing, Magnaflux Inspection, Laboratory Physical Testing.

*LICENSED PROCESS

THE Lakeside Steel Improvement Co.

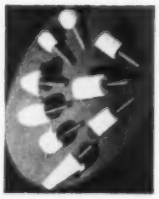
3418 LAKESIDE AVE., CLEVELAND 14, OHIO HENDERSON 1-9100

CIRCLE INFORM-A-GRAM KEY NO. 1081

TICKLISH FINISHING JOB?

do it better with a Paramount Felt Bob

If you have a tough polishing, buffing, lapping or de-burring finishing problem where tolerances must be held close, solve it by putting a Paramount Bob on the job. Seven custom shapes, 42 sizes, four degrees of hardness from soft to rock hard — there's a Paramount Bob ideal for every close-quarters precision finishing job. For example:



MICRO-FINISHING

Paramount Felt Bobs make ultra-fine finishing of surfaces quick, easy and economical.

DIE AND MOLD MAKING

Thousands of die and mold makers depend on Paramount Bobs to perform precision finishing and buffing operations. Ideal for removing burrs without destroying close tolerances.

NEW BOB ASSORTMENT KITS

K-1 Assortment includes 24 mandrel mounted bobs, 36 small wheels, touch-up pads — 66 pieces all together — packaged in one convenient bench top box. (K-2 Assortment also includes four sticks assorted polishing compounds.)

These handy assortments provide bobs of just the size, shape and hardness you want — and at $10.95 (K-1) and $12.95 (K-2) they are far below the cost of buying bobs separately.

See your jobber or write for literature

BACON FELT CO. JOBBER INQUIRIES INVITED

467 West Water St., Taunton, Mass

CIRCLE INFORM-A-GRAM KEY NO. 1082

ARMSTRONG

Drop Forged CLAMPS

LEADERS IN THE DROP FORGED CLAMP FIELD

. . . in design, machining and strength; in completeness of line in both sizes and types.

Designs are based on a full knowledge of clamp uses and requisites. Drop forging assures die-perfect form, texture toughness and freedom from structural faults. Maximum stiffness is attained by a discerning selection of steels with accurate controlled heat-treating, tempering and testing.

For dependability and long useful life, specify and standardize on ARMSTRONG Drop Forged Clamps.

Buy ARMSTRONG TOOLS from your Industrial Distributor

Write for new ARMSTRONG General Catalog

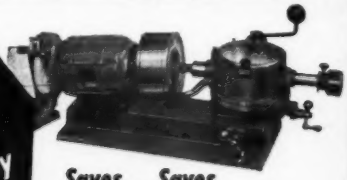
ARMSTRONG BROS. TOOL CO.

5220 W. ARMSTRONG AVE., CHICAGO 46, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 1083

Super MULTI-SPIRAL END MILL GRINDING FIXTURE

SHARPENS END MILLS Quickly . . . Completely IN YOUR OWN SHOP



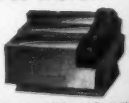
Saves Time • Saves Money

For grinding or milling of any spiral lead. Pays for itself in a hurry. Send for facts today.

SPIRAL SPECIAL CUTTING TOOLS

Cut Operations 75% or More!

Custom-designed, precision made, exactly to fit your needs. Boost both output and quality. Ask for details.



SPIRAL STEP TOOL COMPANY

Designers and Manufacturers of All Types of Special Cutting Tools

5400 N. Damen Ave. • Chicago 25, Ill.

Phone: LOngbeach 1-5384

CIRCLE INFORM-A-GRAM KEY NO. 1084

A Three-Fluted Burr-Bit, designed to fit three fluted taps, can tap and debur a hole in one continuous operation. Burr-Bits, which come in #6 to ½", may be used with friction

type tapping heads or lead screws, on single or multiple units as well as on hand tapping fixtures. Vernon Devices, Inc., 481 E. 3rd St., Mt. Vernon, N. Y., or —
Circle Inform-A-Gram No. A55.

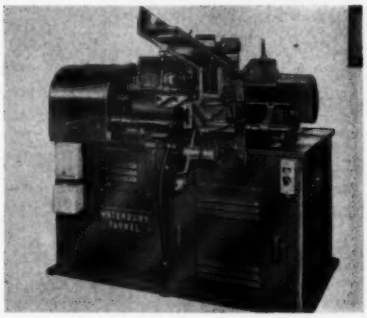
A Motor-Driven Centralizing Reel is suitable for material up to 16" wide, ID from 14½" to 22", OD 42". Model ACR-1642 centralizing arrangement, controlled by a hand-

wheel and the cross members to suit the ID of the coil, expands or contracts depending on the direction or rotation of the wheel. For information, write U. S. Tool Co., Inc., Ampere, N. J., or —
Circle Inform-A-Gram No. A56.

Standard Turret Indexing Machine Chassis can be used in economical construction of special automatic machines requiring a rotary intermittent motion. The chassis can meet

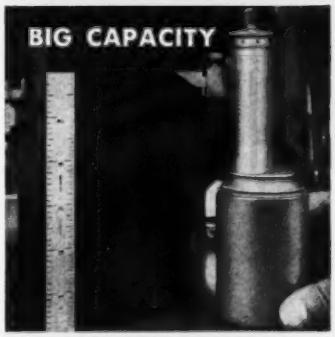
processing, assembling, and light secondary machining operation requirements with a range of 36" to 54" turret diameters and 6 to 32 index positions. Swanson-Erie Corp., 814 E. 8th St., Erie, Pa., or —
Circle Inform-A-Gram No. A57.

A Medium Screw Cap Thread Rolling Machine handles shells from ¼" to 2½" long using semi-automatic feed. A sliding key clutch permits semi-automatic or hand feed, and the newly-designed swinging tailstock can be adjusted to compensate for axial deflection of the spindle on heavy gauge or small diameter work. The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., or—
Circle Inform-A-Gram No. A58.



MICRO-HEIGHT® GAGE SIMPLIFIES

layouts and inspections



Ends vernier reading problems. Combination of direct reading from zero at base...plus quick and easy movement, saves times, reduces errors, increases accuracy.

1 **Micro-Height Gage reads faster than vernier-type gages.** Eliminates need for eye loupe. Hundredths on big barrel... thousandths on easy-to-read thimble. Box at left shows ease-of-use for fast layout.

2 **Quickly reversing scriber** by putting it at top of support adds 1" to capacity. You get 3" direct range with Micro-Height "2"; 5" range with Micro-Height "4". To increase capacity up to 6" more, screw lapped Riser into gage base.

3 **For fast, accurate inspections** – replace Scriber with your present dial indicator. Now, by rotating thimble, you can quickly read distances between heights or holes without removing gage from surface plate.

Micro-Height "2" (3" range) **$36.50**
Micro-Height "4" (5" range) **$57.00**

Accuracy ± .0003". Simple adjustments to maintain accuracy. Rustproof satin-chrome finish.

Accessories
Scribers: steel or carbide tip • **Dial-indicator Holder**
Risers: 1, 2, 3, 4, 5 and 6 inches • **Plush-lined Cases**

Call your **GREIST** *distributor or write*
THE GREIST MANUFACTURING COMPANY, 435 BLAKE ST., NEW HAVEN 15, CONN.
Precision Products since 1871
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A Bench Type Grinding, Finishing, and Deburring Machine, Versa-Mite, incorporates a fast cutting abrasive belt and a serrated contact wheel. A coated abrasive disc, fastened to the side of the contact wheel, and a tilting adjustable table permit square and angle grinding as well as chamfering and surfacing. For information, write Curtis Machine Div'n, The Carborundum Co., Jamestown, N. Y., or —
Circle Inform-A-Gram No. A59.

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GROUND-FROM-THE-SOLID
DRILLS

Right you are when you specify Ace Ground-from-the-Solid Drills! Chances are you'll find the expanded Ace line includes standard stock drills that are tailor-made for your job. Long ones, short ones. Big ones, small ones. Drills made of top quality, uniformly hardened high speed steel. Carbide tipped and solid carbide drills, too. What's more, you'll find that every Ace drill is *pointed right* for you . . . finished with highly polished flutes and stronger, keener cutting edges that resist wear and breakage, stay on the job longer. So be right, buy right . . . specify "Ace".

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ADRIAN, MICHIGAN
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Taper Length Drills	Stub Length Drills	"Hi-Brinell" Drills	Carbide Tipped Drills
12"-18" Longboy Drills	Heavy Duty Drills	Solid Carbide Drills	Step and Subland Drills
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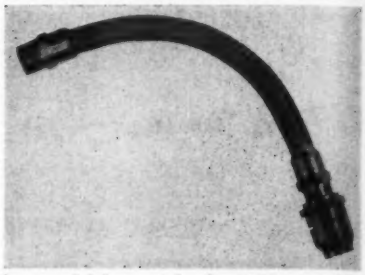
An Aerator Coolant Nozzle is designed to deliver a heavy, non-splash, stream of aerated lubricant or coolant at all times. The Full-Flo nozzle is furnished assembled to a flexible



hose which may be bent to any desired position; 9", 12", and 15" lengths are available. For information, write Universal Metal Hose Co., 2133 S. Kedzie Ave., Chicago 23, or— **Circle Inform-A-Gram No. A60.**

Small Size High Precision Flat Lapping can be performed in small working areas using a 9" flat lapping machine. Close tolerances of 11.6

millionths of an inch are obtainable. Automatic or hand lapping is possible. For information, write Spitfire Tool and Machine Co., 2931 N. Pulaski Rd., Chicago 41, or — **No. A61.**

A 4-Post Multi Max Punch Press, developed for short run production and standby tooling, also can be converted for automatic stamping by adding any standard roll feed or

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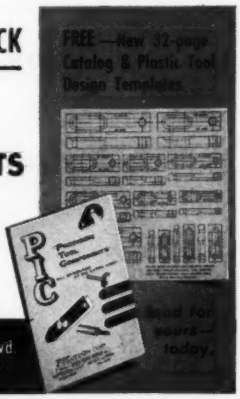

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SHEAR BLADES
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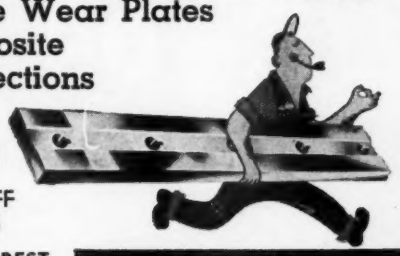

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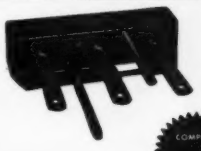

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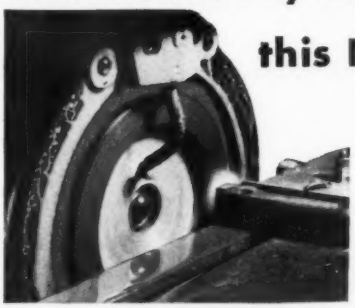

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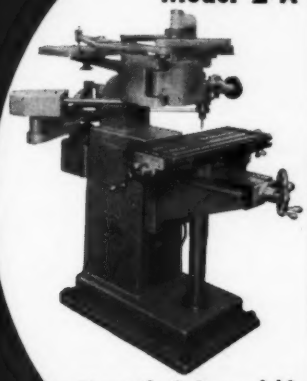

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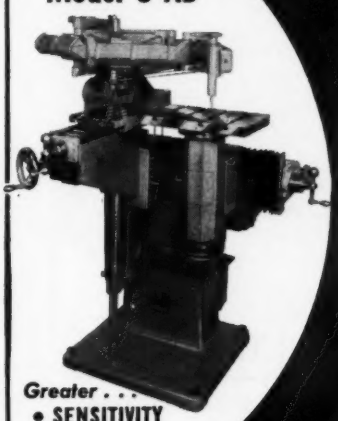

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Model 2-A performs tracer-controlled engraving operations plus die cutting and profile work.

The 3 Dimensional J & B pantograph miller Model 3-AB is a sturdy production machine which reproduces copy on flat or curved surfaces, in reduced or magnified size.

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PRODUCTION TOOL DIVISION
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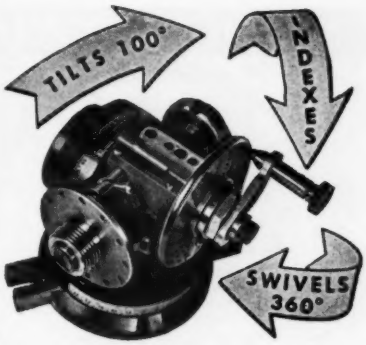

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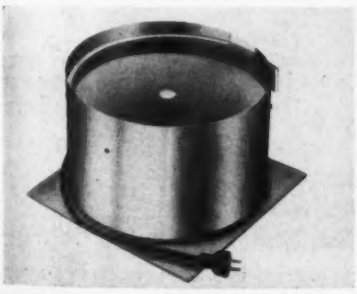
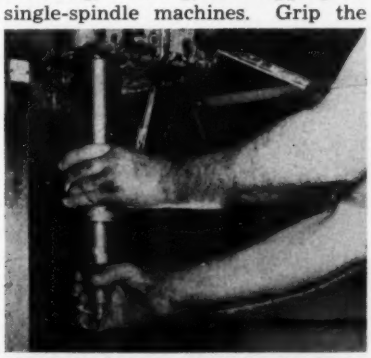
A Small Parts Vibratory Feeder provides a continuous, repetitive, single line feed of small parts such as rivets, screws, nails, nuts, and rings. The unit consists of an integrated bowl fixed to electro-magnetic



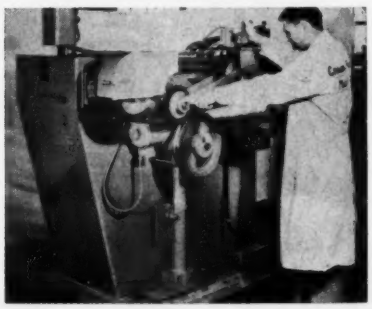
power drive ready to install to the machine doing the work. For information, write Burklyn Co., 3429 Glendale Blvd., Los Angeles 39, or **Circle Inform-A-Gram No. A63.**

Safety-Guard Quick-Change Chucks make tool changes faster and safer when sequence drilling, counterboring, reaming, and tapping on single-spindle machines. Grip the



plastic safety-guard instead of the collet itself, while lifting the locking ring of the chuck with the other hand. Scully-Jones and Co., 1901 S. Rockwell St., Chicago 8, or — **A64.**

A Sheave Grinder will grind both the throat and the OD of 10" to 42" sheaves with an abrasive belt. Interchangeable contact wheels and extra adaptors make it possible to accommodate various sizes of sheaves. For information, write



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NEW CONCEPT IN AUTOMATIC DRILLING AND TAPPING UNITS

MODEL 500
DULL TOOL LITE
AND
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AUTOMATION | **DRILLMATION** | **TAPMATION**

Drillmation's hydraulic, locked-circuit feed Drilling and Tapping Units are the finest and most completely self-contained of any similar unit available today. Drillmation also offers more essential and exclusive features. Write TODAY for literature.

12 ESSENTIAL Exclusive FEATURES in 1 Unit

- **DULL TOOL CONTROL** Unit will withdraw tool from work and indicate to operator when tool becomes dull.
- **RAPID TOOL CHANGE** Tool may be replaced without changing the controls.
- **UNIFORM TIME CYCLE** Maintains comparatively constant time cycle even when tools become dull.
- **SELF-CONTAINED HYDRAULIC SYSTEM** Delivers only the oil pressure required to overcome machining resistance.
- **COMPLETELY AUTOMATIC** Enclosed electric controls. Unit is "Fail Safe".
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- **FEED CONTROL** Infinitely variable and positive feed rate.
- **RAPID APPROACH AND RETURN** Variable irrespective of RPM.
- **MICRO DEPTH CONTROL** Depth will repeat within .0005 inch.
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- **PRODUCTION MACHINE** Mount in any position. Quiet operation. Self lubricating.

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Write or phone DRexell 6-4223 for price list D-3

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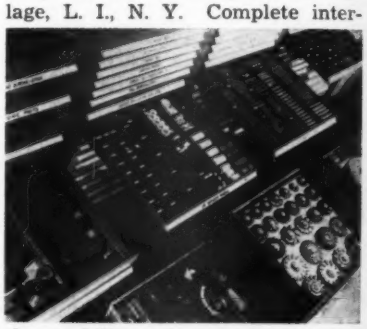
A Small Indicating Bore Gage is capable of checking bores down to 0.032". By the use of interchange-

able gaging heads, it is possible to check any bore within the range of 0.032" to 0.064". For information, write to Boice Gages, Inc., Hyde Park, N. Y., or — **Circle No. A66.**

Solve Storage Problems and save up to 50% of space using an equipment system announced by Vidmar, Inc., a Div'n of Volkert Stampings, Inc., 222-34 96th Ave., Queens Village, L. I., N. Y. Complete inter-



changeability of component units provides for storage of tools, parts, instruments, and assemblies. Carrying capacity is up to 400 lbs/drawer. **Circle Inform-A-Gram No. A67.**

For Remote Pilot Operation on large, high speed brakes and clutches, use poppet-type control valves. These Hi-Speed Inlines are said to provide almost instantaneous response, due

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Model DL

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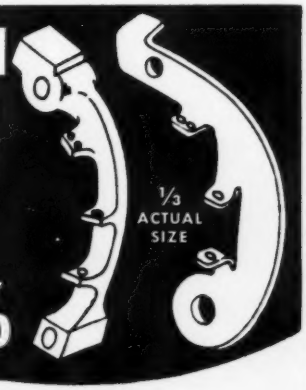
REDESIGN FROM CASTING TO STAMPING CUTS CUSTOMER'S COST 54%



Formerly a casting was used involving machining and drilling at $1.76 each. Converted to a stamping, the part was blanked, punched and formed at only $81.00 for the first 100 pieces. Subsequent 100 lots cost only 13¢ each—a 93% saving for the customer.

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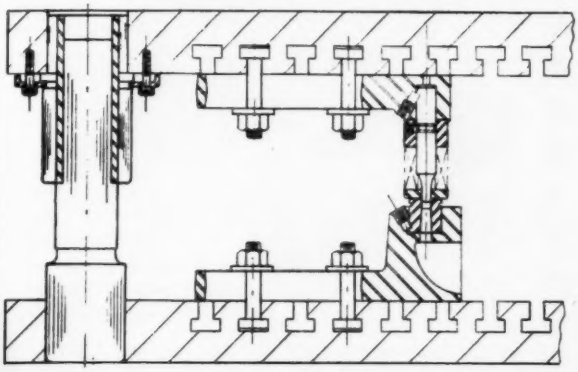
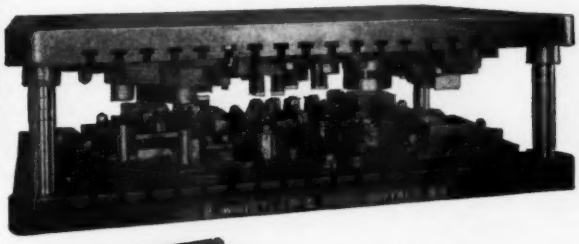
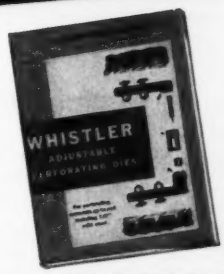
• Operate like a single purpose die • Easy to set-up and make changes • Interchangeable and re-usable parts always ready for a new job • Reduce die costs to a new low • Pierce holes in any desired arrangement of shapes and sizes • Precision piercing of materials to ¼" thick steel.



Above: Sectional drawing of a Whistler adjustable punch and die unit assembled in T-slot die set. **Below:** A completely assembled Whistler adjustable die ready for the press.





YOU NEED THIS CATALOG

to see for yourself in dollars and cents what this adjustable die making method can do for your plant. Send for it right now...without obligation.

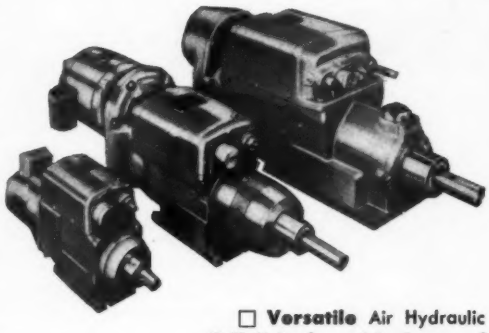
S. B. WHISTLER & SONS, INC.
748 Military Road, Buffalo 23, N. Y.

ADJUSTABLE, MAGNETIC and CUSTOM DIES FOR ALL INDUSTRY
Direct Factory Representatives Located in Principal Industrial Areas

CIRCLE INFORM-A-GRAM KEY NO. 1153

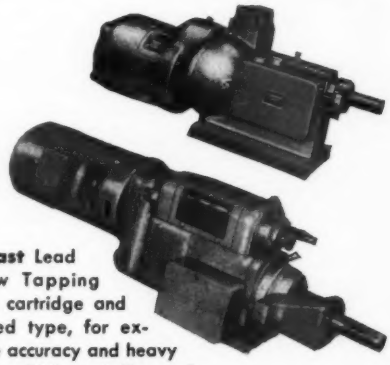
YOU

CAN CUT PRODUCT COSTS WITH HARTFORD POWER UNITS



☐ **Versatile** Air Hydraulic Drill Units for quick change of set-ups, rapid operation.

☐ **Positive** Automatic Cam Feed Drill Units for "tamper-proof" accuracy on long runs, faster cycling, lower cost per piece.



☐ **Fast** Lead Screw Tapping Units, cartridge and geared type, for extreme accuracy and heavy duty multiple spindle work.

☐ **Powerful** Way Type Hydraulic Feed Units up to 30 h.p. with "Balanced Thrust", rigid accuracy, quick traverse, long travel on hardened ways for high production, multiple spindle work.

Remember, too, you can keep your tooling cost low by using Hartford "off-the-shelf" machine components — bases, columns and adapters.

☑ Check the type that will reduce **your** manufacturing costs. Write today for full information and name of our nearest field man — a specialist in low cost production techniques.

THE HARTFORD SPECIAL MACHINERY COMPANY
MACHINE TOOL DIVISION
2926 HOMESTEAD AVENUE, HARTFORD 12, CONN.

HARTFORD Special

CIRCLE INFORM-A-GRAM KEY NO. 116

READER SERVICE CARD **JUNE 1958 ISSUE**

DO NOT USE THIS CARD AFTER AUG. 31, 1958

INFORM-A-GRAM

TOOLING and PRODUCTION:

Please have information on items circled sent to me.

YOUR NAME _____ YOUR TITLE _____
(Please Print or Typewrite)

COMPANY NAME _____

COMPANY ADDRESS _____

CITY _____ ZONE _____ STATE _____

(Please use only one of these INFORM-A-GRAM cards for yourself and let one of your associates use the other.)

ADVERTISEMENTS

2	21	57	77	110	812	932	1032	1111	1192	1261	1305
3	22	58	78	116	813	933	1033	1112	1193	1262	
4	23	59	79	117	814	951	1034	1113	1201	1263	
5	24	60	80	133	821	952	1041	1114	1202	1271	
7	25	61	83	135	822	953	1042	1115	1203	1272	
8	26	62	84	137	823	954	1043	1116	1221	1273	
9	27	63	85	139	871	955	1044	1121	1222	1274	
10	28	65	89	140	872	961	1045	1122	1223	1281	
11	29	66	91	141	873	962	1046	1123	1234	1282	
12	30	67	92	142	874	963	1071	1124	1231	1291	
13	31	68	94	641	881	991	1072	1131	1232	1292	
14	32	69	97	642	882	992	1073	1132	1233	1293	
15	33	70	98	643	883	993	1074	1141	1234	1294	
16	34	71	101	644	884	994	1075	1142	1241	1295	
17	36	72	102	751	901	1001	1081	1151	1232	1301	
18	53	73	105	752	902	1002	1082	1152	1251	1302	
19	55	74	106	753	903	1003	1083	1153	1252	1303	
20	56	76	109	811	931	1031	1084	1191	1253	1304	

EDITORIAL ITEMS

A1	A19	A37	A55	B5	B23	B41	C4
A2	A20	A38	A56	B6	B24	B42	C5
A3	A21	A39	A57	B7	B25	B43	C6
A4	A22	A40	A58	B8	B26	B44	C7
A5	A23	A41	A59	B9	B27	B45	C8
A6	A24	A42	A60	B10	B28	B46	C9
A7	A25	A43	A61	B11	B29	B47	C10
A8	A26	A44	A62	B12	B30	B48	C11
A9	A27	A45	A63	B13	B31	B49	D1
A10	A28	A46	A64	B14	B32	B50	D2
A11	A29	A47	A65	B15	B33	B51	
A12	A30	A48	A66	B16	B34	B52	
A13	A31	A49	A67	B17	B35	B53	
A14	A32	A50	A68	B18	B36	B54	
A15	A33	A51	B1	B19	B37	B55	
A16	A34	A52	B2	B20	B38	C1	
A17	A35	A53	B3	B21	B39	C2	
A18	A36	A54	B4	B22	B40	C3	

Which article in this issue was of most interest to you? _____

THESE INFORM-A-GRAM CARDS are for the convenience of *TOOLING and PRODUCTION* readers who, we know, rarely have stenographic help at their beck-and-call while reading. To get further information concerning selected items featured — all one needs is an INFORM-A-GRAM card and a pencil or pen to circle the numbers of the items wanted. If there is no identifying number, use the page number.

Our reader service department is handling over 100,000 reader inquiries per year and it is essential that the blanks at the top of each card be filled in accurately and completely. Please use only one of these INFORM-A-GRAM cards for yourself and let one of your associates use the other.

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A7	A25	A43	A61	B11	B29	B47	C10
A8	A26	A44	A62	B12	B30	B48	C11
A9	A27	A45	A63	B13	B31	B49	D1
A10	A28	A46	A64	B14	B32	B50	D2
A11	A29	A47	A65	B15	B33	B51	
A12	A30	A48	A66	B16	B34	B52	
A13	A31	A49	A67	B17	B35	B53	
A14	A32	A50	A68	B18	B36	B54	
A15	A33	A51	B1	B19	B37	B55	
A16	A34	A52	B2	B20	B38	C1	
A17	A35	A53	B3	B21	B39	C2	
A18	A36	A54	B4	B22	B40	C3	

Which article in this issue was of most interest to you? _____

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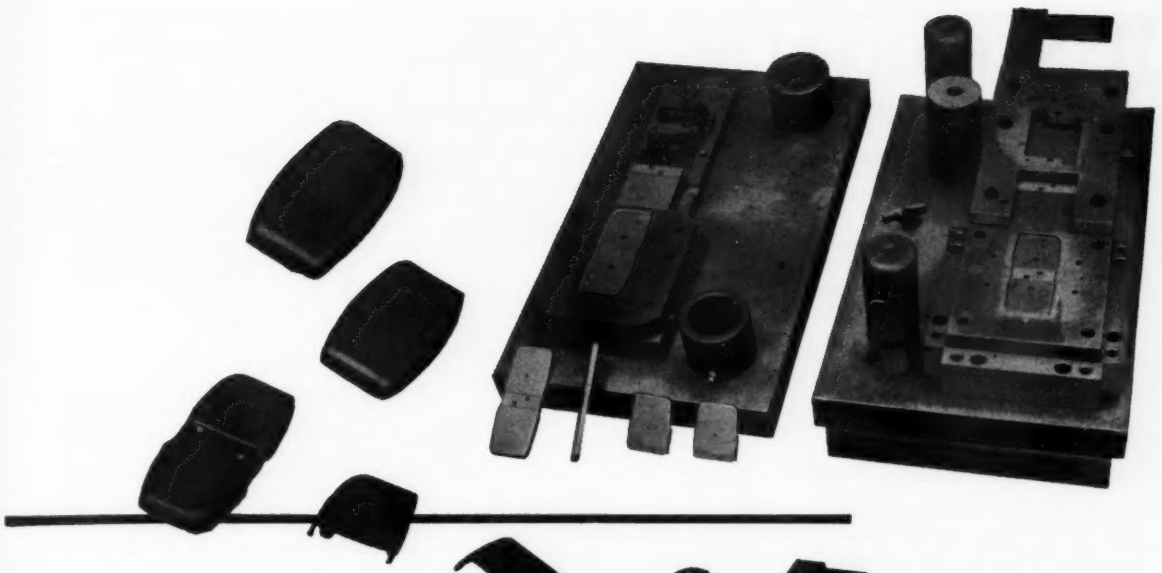
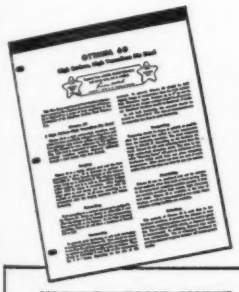


These OTTAWA 60 DIES PAYOFF BIG IN 3 WAYS

- ★ Buffing Time Reduced ½
- ★ Rejects Reduced 20%
- ★ Stoning and Regrinding of Dies Reduced 75%



Write for BLUE SHEET on OTTAWA 60

This concise four-page folder gives all needed handling and shop treatment details on Ottawa 60. Included is certified laboratory information on physical characteristics, and complete data on forging, annealing, hardening, tempering, etc. *Ask for your copy.*

ADDRESS DEPT. TP-6

WSW 6648

One way to increase profits is to reduce finishing costs. That's what a fabricator of hearing aid cases accomplished when he switched from regular die steel to A-L's air hardening Ottawa 60 high carbon-high vanadium grade.

Ottawa 60 dies produced stainless steel cases which were free from galling and scoring—were nearly perfect as they came out of the dies. Less than half the previous buffing time was needed to bring them to the required high finish. Rejects—which ran about 20 percent before the use of Ottawa 60—were reduced almost to the point of elimination. Also, the new Ottawa 60 dies required stoning and regrinding only a quarter as often as the standard tool steel dies they replaced.

This same manufacturer has passed along significant savings to other customers through the use of Ottawa 60. By practically eliminating rejects due to corner cracking and scoring, customers receive better stamped parts at lower per-piece cost.

Let us show how you, too, can save with A-L tool steels and, at the same time, furnish your customers a better product.

Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.

For nearest representative, consult Yellow Section of your telephone book.

For complete MODERN Tooling, call

Allegheny Ludlum

AL ® FINE TOOL STEELS SINCE 1854

CIRCLE INFORM-A-GRAM KEY NO. 117

MANUFACTURING MEMOS

Co-Authors Get Award . . .

• The 1957 Manly Memorial Award of the Society of Automotive Engineers was awarded to Roger E. Matzdorff and Clifford E. Newberry of Marquardt Aircraft Co. for their paper, "Requirements, Parameters, and Design Considerations for Pneumatic Inlet Control Systems." The award is for "the best technical paper relating to theory or practice in the design or construction of, or research on, aeronautic powerplants or their parts or accessories."

New Division Formed . . .

• Universal-Cyclops Steel Corp. has organized a new Refractomet Div'n to advance the company's participation in the commercial development of refractory and reactive metals. Fred A. Kaufman has taken over as vice president of the parent company and general manager of the new division.

Name Changes Revealed . . .

• To keep up with its expanding product line, National Cylinder Gas Co. has changed its name to Chemetron Corp., to incorporate the chemical, metal, and electronic industries they serve.

• The Philadelphia Gear Works, Inc. has changed its name to Philadelphia Gear Corp. to more accurately describe the company's activities.

• The Vulcan Crucible Steel Div'n of H. K. Porter Co., Inc. will now be known as Vulcan-Kidd Steel Div'n. This newly combined division is made up of the Kidd works, recently acquired by the company, and the Vulcan Works.

Conference President . . .

• The president of the National Electronics Conference for 1958 is Joseph H. Enenbach, supervising engineer at the Illinois Bell Telephone Co. Other officers include Executive Vice President M. H. Crothers, University of Illinois; Secretary C. W. McMullen, Northwestern University; Treasurer J. H. Kogen, Askania Regulator Co.; Executive Secretary R. E. Bard, General Radio Co.; and Assistant Treasurer G. J. Argall, DeVry Technical Institute.

Receives Citation . . .

• For outstanding contributions to the science of lubrication, Earle A. Ryder is the winner of this year's American Society of Lubrication Engineers' National Award. His research has aided in the development of several pieces of test equipment designed for evaluating lubricants and materials for gears and bearings.

The Micro Deburring Co. has announced the purchase of plant, equipment, and all other assets of the Illinois Deburring Co. All facilities will be consolidated at Micro Deburring's plant, which specializes in techniques for finishing metal parts to superfine tolerances.

◆

The acquisition of Hydro Metal Spinning Corp. as a wholly owned subsidiary of United States Chemical Milling Corp. has been announced. The subsidiary, producer of precision parts and components and subcontractor to the aircraft, missile, and electronics industries, will now assist USCM in the production of chemically-milled parts and in carrying out special fabrication operations in USCM-produced parts.

◆

Recent purchase of the Arter Grinding Machine Co. has been announced by Sundstrand Machine Tool Co. Arter assets purchased by Sundstrand will be integrated into the capital goods division of Sundstrand under vice president Burnell A. Gustafson.

◆

All machinery, inventories, and patents relating to the diesel operations of Micromatic Hone Corporation's Micro-Precision Div'n have been sold to the Allis-Chalmers Mfg. Company.

◆

Announcement of the purchase of Breese Burners, Inc. by Controls Company of America has been made. The development and engineering operations and sales offices will be run as a wholly-owned subsidiary but will be operated independently of the parent company and retain the Breese name.

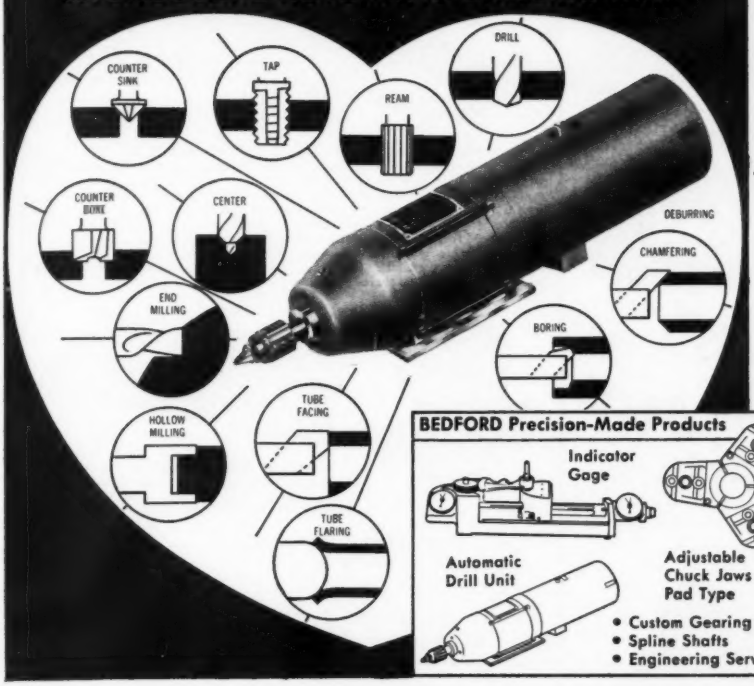
◆

The consolidation of Bausch & Lomb Optical Co. and Applied Research Laboratories has been announced. ARL will be operated as a wholly-owned subsidiary known as Applied Research Laboratories, Inc., Subsidiary of Bausch & Lomb Optical Co., and will give improved technical service and stimulate development of new forms of automatic control instruments.

The "HEART" of Automation . . .

Bedford Gear's

HYDROSCAPE AUTOMATIC DRILLING UNIT



BEDFORD Precision-Made Products

- Custom Gearing
- Spline Shafts
- Engineering Service

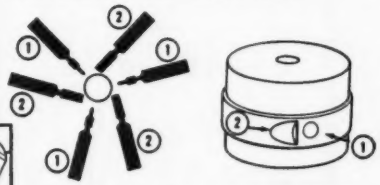
More Automatic Operations Per Dollar!

PROVEN:

10% REDUCTION in cycle time by the addition of ONE BEDFORD Hydroscape Automatic Drilling Unit to the production line.

PROVEN:

6½ MINUTES LESS than the next best alternate machining method.

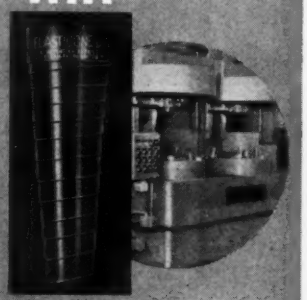


WRITE FOR FREE CATALOG AND DATA SHEETS.

CIRCLE INFORM-A-GRAM KEY NO. 1191

NEW WAY

to lower production costs . . . improve product efficiency



ELASTICONE® PROTECTIVE COVERINGS

cover-up vital exposed shafts and bushings!

Versatile Elasticones snap over all types of exposed shafts, bushings, pins and screws, guarding them against damage, reducing breakage, lubrication problems and shutdown time.

Elasticones are spirally wound cones of flat steel, formed in all sizes to meet all requirements. They're low-costing, easy to install.

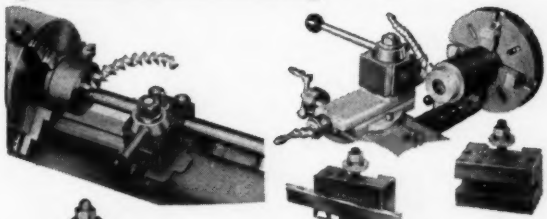
Write for complete data including new Bulletin '57.

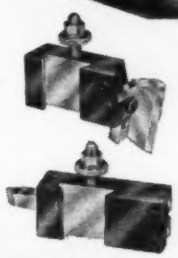
CENTRAL Safety Equipment Co.
6603 Marsden Street Philadelphia 35, Pa.

CIRCLE INFORM-A-GRAM KEY NO. 1192

YOUR LATHES "TURN OUT" BIGGER PROFITS

WITH **ALORIS** QUICK CHANGE **TOOL POSTS & TOOL HOLDERS**





Change tools instantly—for turning, facing, drilling, boring, threading, knurling, cutting off or any operation.

- Maximum Repetitive Accuracy Assured
- No Shims . . . No Time Wasted
- Unlimited Versatility
- Saves 90% Set-up Time, 50% Production Time
- Greater Rigidity
- Leading Lathe Mfrs. Recommend It
- Sizes to Fit Every Lathe
- Unconditionally Guaranteed

NEW! Aloris Holder for Carbide Triangular Inserts.

Greater rigidity, versatility, efficiency & economy

Write For Catalog & Price List

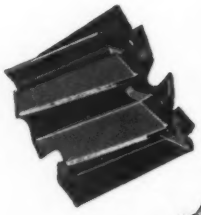
ALORIS TOOL CO., INC. 419 Getty Avenue Clifton, New Jersey

CIRCLE INFORM-A-GRAM KEY NO. 1193

Remember:

A used tool is proved metallurgically sound and makes a sound tool when reworked.

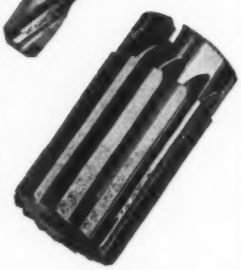
Systematic "NTS" salvage is the best way to cut cutting tool costs



Stop before you discard a worn or damaged cutter. It may be worth many times its scrap value!

Since 1912 we have been restoring all kinds of cutting tools to new usefulness to help shops control their cutter costs.

Can we assist you in studying your operations and tool usage to determine if a salvage program will save money in your plant? There is no obligation.



Write for this catalog and the salvage story.

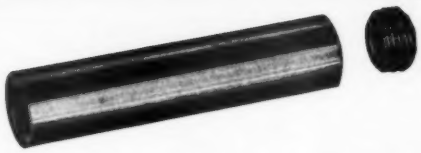
NATIONAL NTS TOOL SALVAGE

NATIONAL TOOL SALVAGE CO.

6511 EPWORTH BOULEVARD DETROIT 10 MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1201

How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!



One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.

The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

SLEEVES MADE IN FOLLOWING SIZES:
3/16, ¼, 5/16, ⅜, 7/16, ½, ⅝, ¾, 1"

●

STURDY BROACHING SERVICE, INC.
23516 TELEGRAPH RD., DETROIT 41, MICH.

Write for Literature

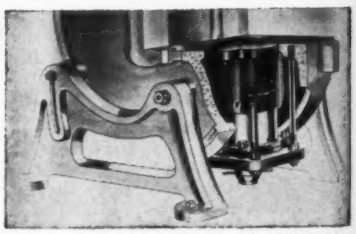
CIRCLE INFORM-A-GRAM KEY NO. 1202

DIE CUSHIONS

for all DEEP DRAWING operations

●

- Furnished complete ready to install.
- Operate perfectly on all shop air lines.
- Accurate, adjustable working pressures assured.
- Quick setup saves time.
- Press bed or bolster plate mounting.
- 17 Models available from stock, sizes 3" thru 16".
- Die cushions available for any power press. Engineering service at your disposal. All die cushions installed on trial basis.



Full Universal Pneumatic Die Cushion

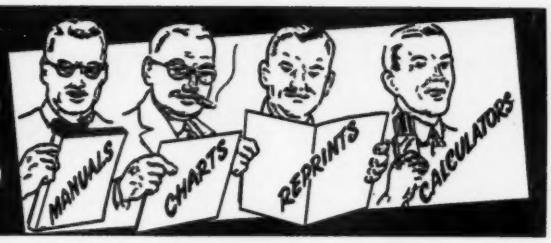
WRITE FOR CATALOG "PNEUMATIC DIE CUSHIONS"

DAYTON ROGERS *Manufacturing Company*

MINNEAPOLIS 7B, MINNESOTA

CIRCLE INFORM-A-GRAM KEY NO. 1203

SHOP AIDS



A Data File on the use of Strenes metal (a chromium-molybdenum alloyed gray iron) in the stamping industry, is now available. Applications, including drawing and forming dies, are described and illustrated in bulletins and data sheets. Write to The Advance Foundry Co., 107 Seminary Ave., Dayton 3, Ohio, for your copy, or — **Circle No. C1.**

An 88-Page Comprenhensive Catalog has been announced by Vascoloy-Ramet Corp., Waukegan, Ill. Specifications on carbide and tantung blanks, tools, and inserts, are presented. Examples of specific uses as well as and angle grinding information are included for the cutting tools and inserts. Characteristics and applications of the various grades of carbide are given in chart form for easy selection. Get your copy of Catalog VR-58 from the company, or —
Circle Inform-A-Gram Key No. C2.

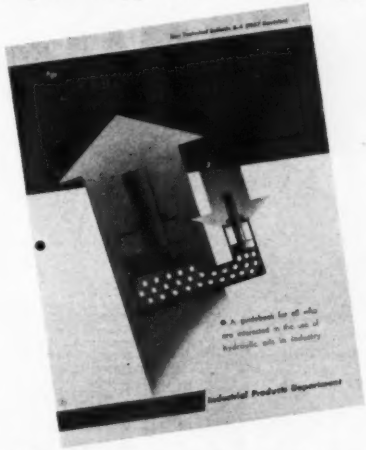
"Tool Steels for Forging Operations" contains information on the use of various grades of tool steels for the hot forging of steel. Charts present data on heat treatment recommended for dies in drop forging; insert, extrusion, and preloaded dies; gripper dies and header dies or punches in upsetters; and hot working steel projectiles on vertical or horizontal presses. An outline of the important factors to consider when selecting, heat treating, and using these steels is also given. Write to Crucible Steel Company of America, Oliver Bldg., Pittsburgh 22, or —
Circle Inform-A-Gram Key No. C3.

Preparation of Metal Surfaces for the proper application of Molykote resin bonded lubricant coatings is discussed in a bulletin. Instructions for degreasing all metals; phosphating of stainless steels; and sand blasting of chrome plate, nickel plate, and stainless steel are given. Applications by spraying or dipping and the required baking times are covered. Two bonded coatings are Molykote M-88, an air drying coating, and Molykote X-106, a thermosetting coating requiring baking. Copies of Bulletin 115 are supplied by The Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn., or — **C4.**

A Welding Wire Comparison Chart gives "as-welded" physical properties analyses including tensile strength, elongation, and average Rockwell hardness indications, and lists typical uses for gas welding rods, bare electrodes, automatic welding wire, and metal spray wire. This chart, DH-1218-M, is available from the Page Steel and Wire Div'n, American Chain & Cable Co., Inc., Monessen, Pa., or — **Circle No. C5.**

Over 1,000 Contract Tool and Die Plants are listed in the 1958 Directory of Special Tooling Services. Information includes company name, address, and telephone number; names of individuals to contact; and the types of dies, cutting tools, accessories, and services offered by each company. These are keyed for quick reference. Write to National Tool & Die Manufacturers Assoc., 908 Public Square Bldg., Cleveland 13, or —
Circle Inform-A-Gram Key No. C6.

"Hydraulic Fundamentals and Industrial Hydraulic Oils," a 44-page bulletin, discusses the basic principles of the hydraulic system. Detailed diagrams and explanations are given for the functions of the most important types of valves, pumps,



motors, torque converters, and accessories. Also included is a discussion of important oil characteristics, with sections on oil selection and trouble-shooting. Sun Oil Co., Pheladelphia 3, supplies copies of Bulletin B-4, or **Circle Inform-A-Gram Key No. C7.**

Data Sheets are now available for Universal 3-way machine vises, rotary tables, adjustable lathe fixtures, plain and swivel base machine vises, adjustable angle plates, and milling table vises. Complete specifications for these products are given in tabular form and the descriptions and features are accompanied by illustrations of the items. Universal Vise & Tool Co., Parma, Mich., or —
Circle Inform-A-Gram Key No. C8.

Heat Treating Processes and Processing Equipment are covered in a Datalog, which gives in tabular form data on protective atmosphere annealing, brazing, and hardening of a wide variety of metals, including stainless steel, in continuous, batch, or pit type furnaces. Typical temperatures, hardness values, and tips for preparation of assembly for brazing are among the items listed for easy reference. Get your heat treat Datalog, from Ferrotherm Co., 1861 E. 65th St., Cleveland 3, or —
Circle Inform-A-Gram Key No. C9.

Simplify the Purchase of Aircraft Quality Steels using a guide published by Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80. Determining the desired material is easy with the chart, which lists the specification for Military, Air Force-Navy, and equivalent standard AISI specification for Military, Air Force-Navy, Federal, and AMS aircraft quality steels. Direct requests for "Ryerson Aircraft Steels" to the company, or—
Circle Inform-A-Gram Key No. C10.

Where and How to Use Plunjet Air Gaging Cartridges and how to build single and multiple dimension gages and inspection fixtures are described and illustrated in a 32-page catalog. Instructions for setting up a typical multiple application and also for applying these cartridges to machining operations are included. To aid in engineering an application to solve a specific problem, a tolerance layout and the points to be considered are listed. The catalog also tells how to determine the range of the Plunjet. For your copy of Catalog PGC 58-1, write to The Sheffield Corp., Dayton 1, Ohio, or — **Circle No. C11.**

High-Production, Close-Tolerance HOLES in ONE PASS!

One arbor accommodates several HOLE-MILL sizes.

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Designed for high-speed production of close-tolerance, fixed-diameter holes, the smallest Clark HOLE-MILL cuts stock up to 1" thick. Completes holes from one side in a single pass—without clearing chips! Piloted action makes accurate starts on cylindrical, flat or crowned surfaces. Pilot can be replaced with stub drill.

Uses new M3-type high-speed steel... takes heavy cuts on all materials including alloy steels and permits use of automatic feeds on machines. Can also be used on heavy-duty portable drills. HOLE-MILL sizes from 1" to 4" by fractions, decimal sizes on order. Shanks furnished straight or with Morse tapers, other tapers available. Write for circular and prices! Ask for Clark HOLE-MILL—made by **specialists in Hole-Making Tools!**

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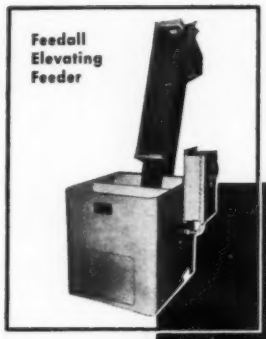

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TYPICAL USES include hopper-load elevating, blade or rotary feeders for centerless grinders, presses, milling machines, heat-treat machines and similar production units.

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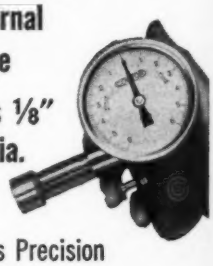
Expanding Internal Gage for holes ⅛" to 10" dia.



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They **BUY** its Precision
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No need to tell you that firms like those listed here, would buy only ASSURED PRECISION in a gage to control volume production of precision holes—at machine—at bench. In Comtorplug, they GET assured precision—but in addition are pleasantly surprised at its economy . . . also how easy it is to put it to work; no air hose, no electronic maze, no heavy base, no indoctrination. If YOUR production calls for precision holes ⅛" to 10" dia. within .0001", by all means send for Comtorplug details.

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REQUEST BULLETIN 50

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UNIVAC STEPS UP PRODUCT DELIVERY TIME BY THREE WEEKS

Greatly improved customer service is high on the list of important benefits now being derived from the large-scale electronic data processing system now in operation at The Carborundum Company, with its delivery of products to customers having been speeded by as much as three weeks.

The Company's integrated order processing procedure is directly responsible for this improvement — its domestic sales offices, warehouses, and plant locations being directly linked by teletype with a Computer Center in Niagara Falls.

The integrated order procedure is a key element within the Company's unique "total systems" approach to electronic data processing, in which all paper work, from customer order straight through to financial reporting, will eventually be completely automated.

Under the new integrated processing procedure, when a customer order is received at one of the sales offices it is processed on a punched-tape typewriter, a machine which produces not only the usual typed document, but also a paper tape record of the information it contains.

The taped information is immediately transmitted over an American Telephone & Telegraph communications network directly to the Computer Center, where a continuously updated and accurate inventory of every item on hand at every location is kept in the Univac's electronic "memory."

As orders are received at the Computer Center, the information recorded on the paper tape is automatically transferred to metallic tape, from which the computer can search and update the inventory while, at the same time, producing a teletype message for transmittal back to the originating sales office, advising it of the action taken so that the customer can be properly and quickly informed. This removes the factor of having the sales offices working in the dark.

In searching the inventory, the computer also automatically orders a product to be shipped out of a neighboring warehouse or plant if it is not available at the originating office; or, if the item is in the "custom" category, it prints out a production order on the factory. This entire process is completed in a matter of minutes.

. . . Continued on page 124

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The National Fontar® Borescope provides sharp, critical close-up vision aided by bright lighting in any bore, threaded hole, recess or interior surface of the cast, drawn, welded or molded product. All that is needed is a point of entry .10" or larger . . . . It's today's essential for high Quality Control standards. Our new and free catalog illustrates and describes applications.

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DIE CAST THEM IN YOUR OWN PLANT WITH MINIMUM INVESTMENT ON

DCMT DIE CASTING MACHINES

Up to 1000 shots per hour! Write for FREE BOOKLET explaining entire process

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BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
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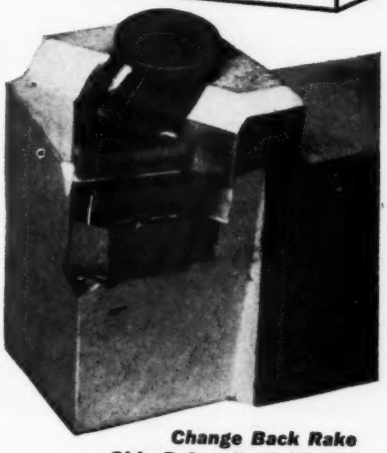
YOU INDEX THE SUPPORT PLATE 4 ways



Change Back Rake
Side Rake • Radial Relief

Variable Geometry TOOL HOLDER

Here's a universal tool holder with an indexing support plate that lets you change rake and relief angles to best suit the metal being cut. For use with standard 0°, 12°, 15° and 30° preform carbide throwaways. You can use one "V.G." holder for commercial grade and high alloy steels; high-ductile aluminum and magnesium, and other non-ferrous materials. Write today for details.

Available piped for mist spray under the chip. You get even greater cutting efficiency, longer tool life, better finishes.

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GRC
DIE CAST & MOLDED NYLON
Fasteners
AT LOWER COST

Widest range of sizes and types . . . new kinds of fasteners never before available from stock . . . automatically produced to assure uniformity, quality and economy.

Write NOW for Catalog.

Die Cast Zinc Alloy
Wing, Cap & Thumb Nuts; Wing & Thumb Screws, Molded Nylon Screws, Washers & Screw Insulators.

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How-To-Do-It REFERENCE BOOKS
USE THIS PAGE AS YOUR ORDER BLANK

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Open account shipments to rated companies. Otherwise payment with order, please. No C.O.D's. Ohio customers add 3% sales tax. Quantity prices quoted on request.

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. . . Univac, from page 123

As a by-product of these operations, the computer will automatically produce stock replenishment orders, making its calculations at electronic speeds and taking into consideration all the factors necessary for proper inventory control — factors too complex for economical evaluation by conventional means for so large a number of products. This operation is now in its initial development stage.

All the data resulting from this processing is stored on magnetic tapes for later use in preparing complete and timely sales and inventory analyses, tools required by all levels of management for effective control of operations.

Obviously this integrated order procedure greatly shortens the time cycle from placement of an order to actual shipment of the goods, sometimes by as much as three weeks. It is equally patent that the integrated system also eliminates the errors normally chargeable to the human factor in processing paper.

Some conception of the saving of time (and consequently of cost) inherent in Carborundum's integrated order processing system may be derived from the fact that order processing and inventory control functions formerly requiring seven or more days may now be handled with ease and in much greater detail by the Univac Data Processing System in approximately eight hours.

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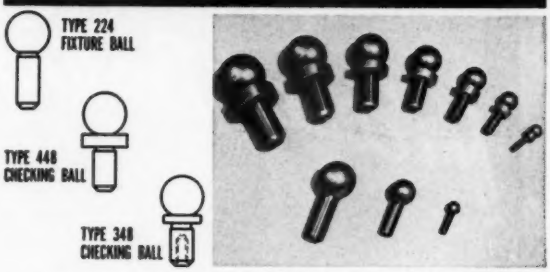
High-Precision Stainless Steel

TOOLING BALLS



- For gage, jig and tool work. Center of ball provides positive reference point for work in any plane.
- Highly accurate. Ball size held to ±.0001" for fixture balls; ±.00002" for checking balls.
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TOOLING BALLS — MASTER BALLS — SPHERICAL FINISHING

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Sperry Monitron increases production, saves man-hours, protects cold-headers in the manufacture of General Electric Telechron Clocks

This cold-header automatically stamps out clock parts in complete safety. MONITRON will stop the machine the instant that it senses a load change, pile-up, misfeed, dull tool, oversize stock, faulty lubrication, etc.

MONITRON is easy to install . . . needs no attention . . . but gives electrically driven presses, conveyors, pumps, automatic machine tools, etc., *every* attention!

Write for complete information. Just attach this advertisement to your company letterhead, give your name and title, and mail to:

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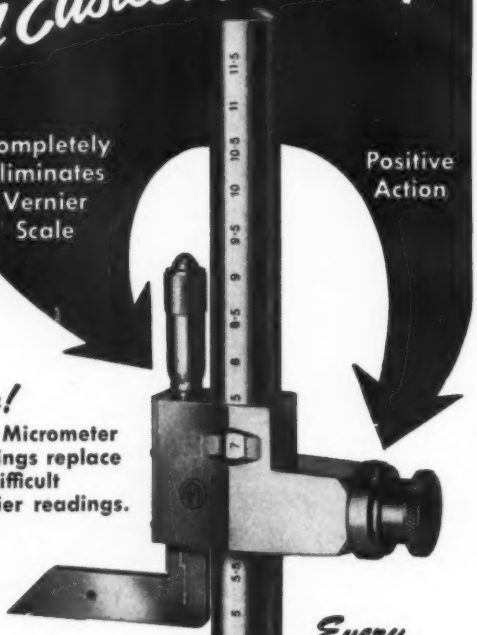
"MICROBALL"
MICROMETER Height Gage
for Easiest Reading

Completely Eliminates Vernier Scale

Positive Action



Now! **Easy Micrometer readings replace the difficult Vernier readings.**

The most inexperienced apprentice will have no difficulty setting and reading this gage accurately.

No Magnifying devices are needed and the hard to read Vernier Scale is eliminated.

Positive action is controlled by accurate indexing at .500", by means of hardened steel balls set in heavy satin finished Chromium plated Steel column. Intermediate settings are made by operating a micrometer gage, incorporated in the design, reading direct to within a tolerance of .0005".

Every **INDUSTRY**

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After selecting the nearest indexed position by means of the adjusting wheel at the rear of the sliding head, simply turn the micrometer thimble until the appropriate graduation gives the required setting.

FOSTER SUPPLIES CO.

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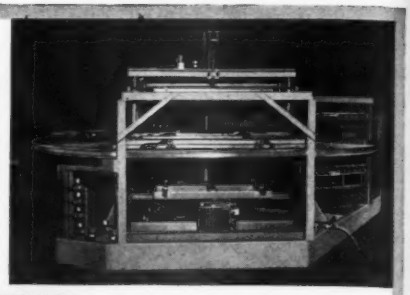
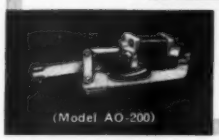
CIRCLE INFORM-A-GRAM KEY NO. 1261

COOL IDEA




(Model AO-200)

FOR REFRIGERATOR MANUFACTURERS

Knu-Vise air-operated clamps are featured on a new 3-station automatic machine developed by the Brown Machine Company, Beaverton, Michigan, for vacuum forming inner door panels and other refrigerator parts at a maximum production rate.

The machine is completely automated with air clamps, mold table, vacuum system and fans, and rotating mechanism all operating from a single switch. 100 panels per hour—as big as 42" x 72"—can be produced.

Quality standards are so high that only dependable Knu-Vise air-operated clamps can be used. Take a tip—investigate Lapeer today!

Manufacturers of over 150 models of manually and air-operated clamps and pliers

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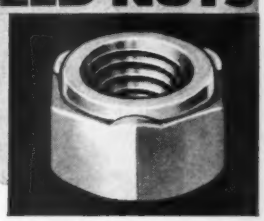
CANADIAN DIV.: HIGGINSON EQUIP. SALES LTD.
1131 Pettit Road, Burlington, Ontario

CIRCLE INFORM-A-GRAM KEY NO. 1262

These 2 WELD NUTS
for blind assemblies



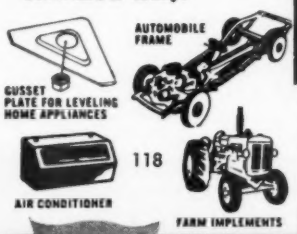
will give you

- Easier Positioning
- Quicker Fastening
- Extra Threaded Depth
- Less Cost

Available with or without Gripco locking feature. Three weld projections on bottom of nut provide a firm non-rocking electrical connection during welding. Write for samples and NEW CATALOG today.

Gripco Pilot-Projection Weld Nut, circular pilot designed, provides quick, easy positioning of nut in bolt hole for instant resistant welding. No jigs, no fumbling, no waste of time. Weld spatter cannot foul threads. Two pilot heights for different metal gauges.

Gripco Countersunk Weld Nut eliminates time-wasting retapping of nuts after welding. Exclusive countersunk nut bottom eliminates fouling of threads by weld spatter. No time wasting false starts, no cleaning of damaged threads, nut ready to receive bolt immediately.



GRIP NUT COMPANY

107 Maple Ave. • South Whitley, Ind.
CIRCLE INFORM-A-GRAM KEY NO. 1263

SELF-LOCKING BOLTS END CHRONIC LOOSENER PROBLEM ON PRESSES

Two hydraulic presses of 500-and 1000-ton capacities used in blanking, piercing, stretching, and forming of a wide variety of commercial laundry and dry cleaning equipment components, were subject to frequent loosening of cap screws and nuts. This condition presented a maintenance problem to the plant owners — The Prosperity Co., Inc.

Weekend maintenance on the presses was accepted routine that required two men with torque wrenches to go over the presses to cinch down all fasteners — 3 hrs each at time-and-a-half rates.

The Unbrako socket head cap screws are made self-locking by the Nylok (nylon) insert seated in a hole drilled part way into their threaded section. The resilient Nylon pellet compresses under the female threads as bolt is installed. Outward pressure is exerted which forces mating threads firmly together under extreme friction.

Self-locking Unbrako cap screws were substituted for conventional cap screws on this 1000-ton press. Previously retightening of fasteners was required weekly. Now, five-month retightening schedule suffices.

Securing the gib plates to the ways on the 500-ton press requires 20 cap screws. These, among others, were continually working loose. In an effort to correct this condition, a representative of Standard Pressed Steel Company suggested that one Unbrako socket head cap screw with Nylok insert be substituted for one of the regular cap screws in the gib plate as a test.

On the basis of this cap screw's performance, the self-locking Un-

ONE TOOL HOLDER DOES THE WORK OF TEN

ONE tool holder for all positions . . . No tool chatter . . . can do internal boring or internal threading . . . Ideal for carbide tools . . .

Bit Sizes: ¼", 5/16", ⅜", 7/16", ½", ⅝"

Furnished with Cobalt Bits

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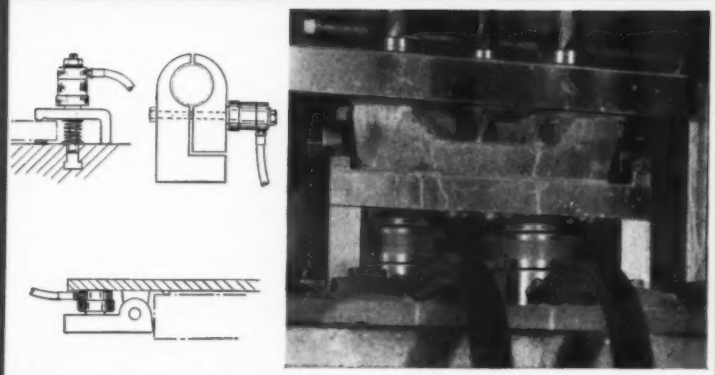

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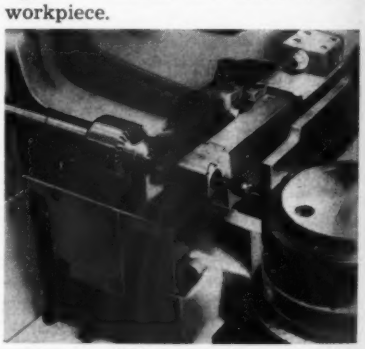

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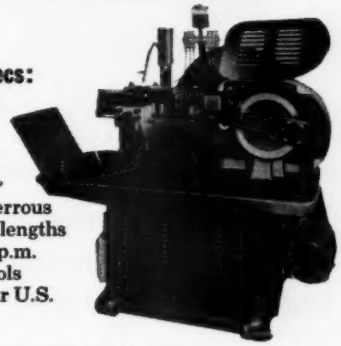

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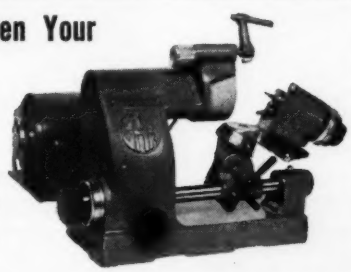

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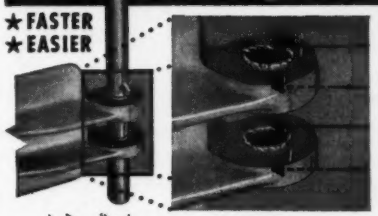

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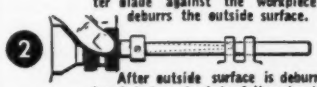

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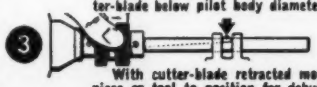

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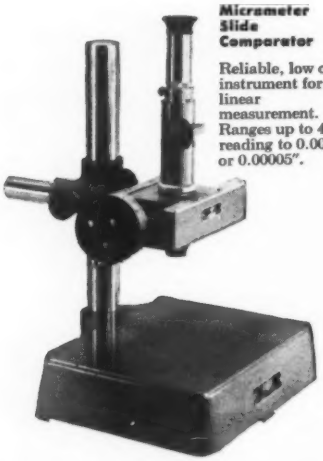

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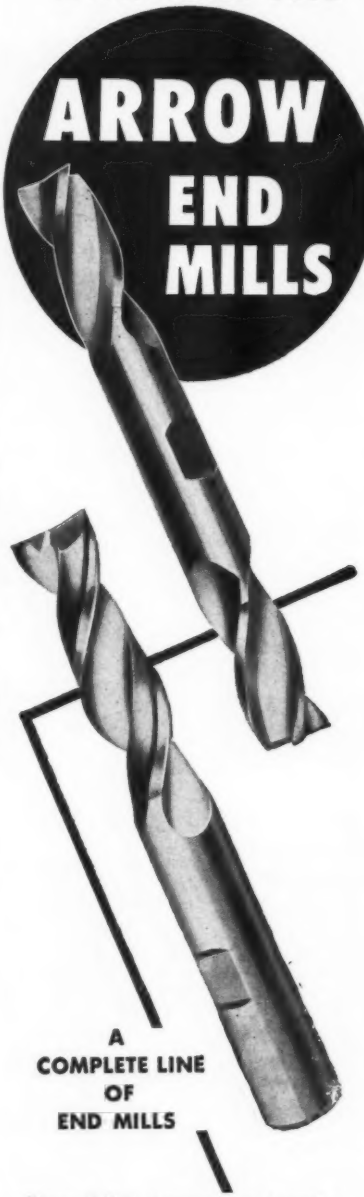

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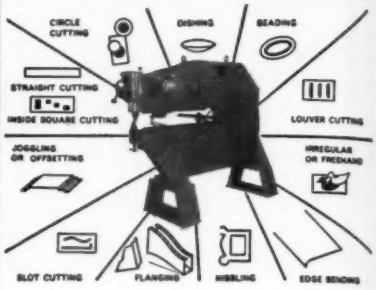

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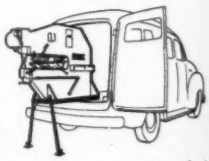

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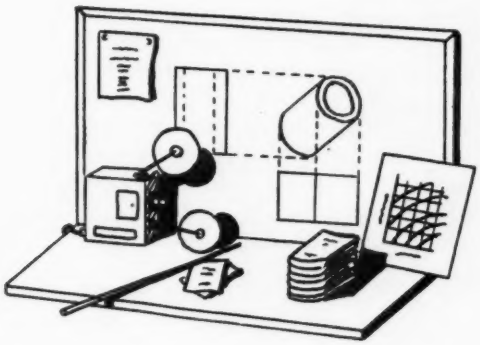

KNOWING HOW EMPLOYEES LEARN MAKES TRAINING EASIER

by Ernest W. Fair
Boulder, Colorado

TIME BRINGS MANY CHANGES in our lives. In business they often come so fast and furious it is difficult to keep up with them. Not the least of these is the development of methods of employee training. This change is one every plant foreman, supervisor, and executive must study continuously.

Topmost factor of importance today is that the most effective way to quickly and thoroughly train employees in any branch of our business is to know and understand how they learn. The old method never considered this; it was usually a case of setting up a routine or a training program and hammering away at it until the employee either assimilated most of it or we gave up in disgust. That's why it is much easier to effectively train employees today.

Basing our program on an understanding of how employees learn and drafting it to fit with these standard procedures provides the answer we seek. Wherever training programs are built around these all important principles of how we learn, training costs are less and effective workers are secured much quicker.

Here, from studies of a number of experts in the fields of employee training and business psychology, are important considerations which we can apply to any training program even in day-to-day personal instruction by immediate supervisors. Here is how we learn:

• We learn by thinking — by using our heads. Any program which forces the individual to think for himself is absorbed easier and more effectively than if we depend on his memory to do the job. All of us understand better the things we think out for ourselves as our comprehension is always deeper and the point stays with us much longer than when a principle is set down to us solely to memorize. When we understand the reasons "why," we are able to think out a problem.

• We learn by having the opportunity to develop at the work itself. For example, any new point a supervisor wishes to put over can always be impressed on employees more effectively if it is set up so that he can develop the work on the job. Programming the point in question so that it can be taken in stages and absorbed into the job section-by-section secures lasting results which are not always attained when the whole thing is given at one time.

• We learn by conditioning to the situation. Popping a man into a job and telling him "Now, here's how the job is done" is a much more difficult way to train him than to first spend a little time preparing him for his assignment in advance. Our experience, our nerves, our feelings—all should be conditioned to the new assignment before it is thrust upon us. That always makes things easier not only for the employee but for the training supervisor as well.

• We learn by practice of each step up on the job. Almost every advanced job requires apprenticeship or training in other jobs along the ladder upward. If we skip them, we multiply our problem. It is much easier to train men or women in "stair step" procedure up toward the bigger job than to thrust them suddenly into it without previous experience.

• We learn by working with others and watching them. One of the most effective methods of training today is in groups rather than as individuals, because it has been found that the average individual learns quicker when he is receiving instruction in such a group. Perhaps the competitive instinct in all

of us accounts for it; maybe there are other reasons. Experts all agree today it is much easier to train men and women to any job by having them work with others and watch already skilled individuals do the work.

• We learn by group demonstration, often better than by individual instruction. Only with the most backward people, on most routine jobs, is individual instruction necessary today.

• We learn by example from our supervisors. Too often supervisors expect to put over successfully training steps merely by lectures. In every test made it was found that the individual learns much quicker and much better when the supervisor goes through an actual demonstration. The only danger is the instructor taking for granted that the employee possesses the same background he does. Demonstrations should be simplified as much as possible, and whenever background data is needed it should be supplied at each necessary step.

• We learn by association with present knowledge or with the things we like to do. Whenever training is leveled to the individual, this very important point should never be overlooked. The closer we can tie in every step of the new job training with the present knowledge of each individual, the easier it will be for him to absorb what is being presented. Actually, training supervisors have found it well worth the extra time to search these out in preliminary interviews. The time so spent is fully repaid in cutting down the expense and the actual training time which otherwise would be prolonged.

• We learn by seeing clearly the ends desired. Too often training comprises "You shall do this" as its basic foundation. Nothing is ever said about "You shall do this because . . . . " Wherever the latter system has been used, training has always been done more effectively and in a great deal less time. When we learn *why* something should be done, we not only absorb the lesson easier but it sticks with us better.

• We learn by reference to printed instructions. Instruction sheets given the individual to take home with him can be of immense help in a training program. That man will think of a dozen questions after he gets home from training — information or steps he may have been given could be hazy but if he has a printed instruction sheet to refer to there would be little need to go over them again and again the next day.

• We learn by following previously understood patterns or channels. It is often wise procedure to "unlearn" patterns and channels the individual may have absorbed in previous jobs if they are not adaptable to the work for which he or she is now being trained. Learning details of a job can come much easier when we have first understood and absorbed the pattern or channel of procedure.

• We learn by concentrating on details and letting these develop into the "big picture." In training there is always the temptation to speed up the procedure by presenting the overall picture first and trying to get the trainees to understand as much of it as possible. In so doing, we hope to eliminate a number of detailed steps. In almost every instance this results in failure. The average human being can absorb the "big picture" much easier if he is led up to it through the details which comprise the whole.

• We learn by outside study and investigation. Often, given a course to follow, the average man or woman can actually learn more about the new job on their own if such material is made available to them. Many firms are finding secondary aspects of the job can be put over effectively in this manner while primary training emphasis is placed on the major details.

• We learn by following the leader, whether supervisor or fellow worker. Train the leader in a group first, and a dozen will learn from him much easier than from any instructor. In any group there is always one man or woman who stands out from the rest and who the group looks up to or respects. That individual, though a trainee himself, can be very effectively used in training the group as a whole.

• We learn by hope for a reward. Training without any reward in prospect gives the individual no great incentive to expend extra effort. That reward can be any number of things from a job better than the one he now holds to prizes or awards given for best advancement in the training program itself. Often the reward can be placed far in the future, i.e., the training they are receiving is an immediate step upward, but more important, it will fit them for qualifications to even higher posts beyond those for which they are now being trained.

The foregoing examples represent basic principles which can be incorporated into any training from individual instruction by supervisors to group instruction within the company's personnel department programming. They represent the avenues down which such training can proceed more quickly and economically.

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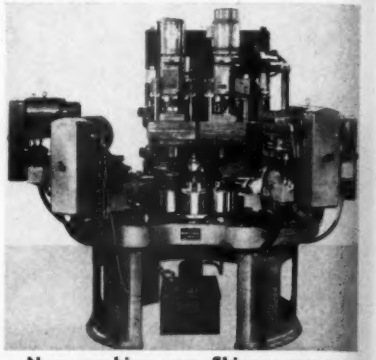
INDEXING MACHINE WITH POWER CHUCK TRIPLES PRODUCTION

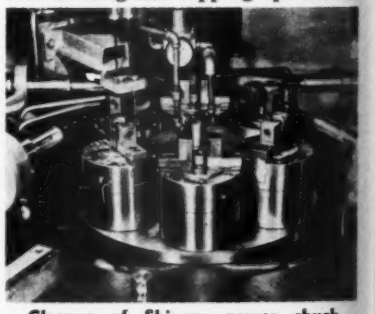
A multi-spindle indexing machine that will utilize six Skinner power chuck fixtures to triple the production of Skinner electric valve bodies, has been developed for Skinner by The Hartford Special Machinery Company. The versatility of the power chuck fixtures makes possible many variations of the standard set-up. Product changeovers can be made simply by changing top blank jaws — a matter of 30 min or less.



New machine uses Skinner power chuck fixtures to triple production of Skinner solenoid valve bodies.

To speed the manufacture of valve bodies, the power chuck fixtures hold the parts for simultaneous drilling and tapping operations at four indexing stations. As a result, the production of 1,000 valve bodies, which heretofore consumed more than 13 hrs, now requires only 4.3 hrs.

The valve bodies will also be machined more accurately as each part is held in one fixture throughout all four drilling and tapping operations.



Closeup of Skinner power chuck fixtures mounted on indexing table.

The jaw is used to guide the drill, thus becoming a drill jig — a new concept combining work holding and drill guiding in one compact unit.

The machine is actuated by Skinner solenoid valves and operators. Air is distributed directly to the power chuck fixtures by a new rotating air valve that Skinner developed recently.

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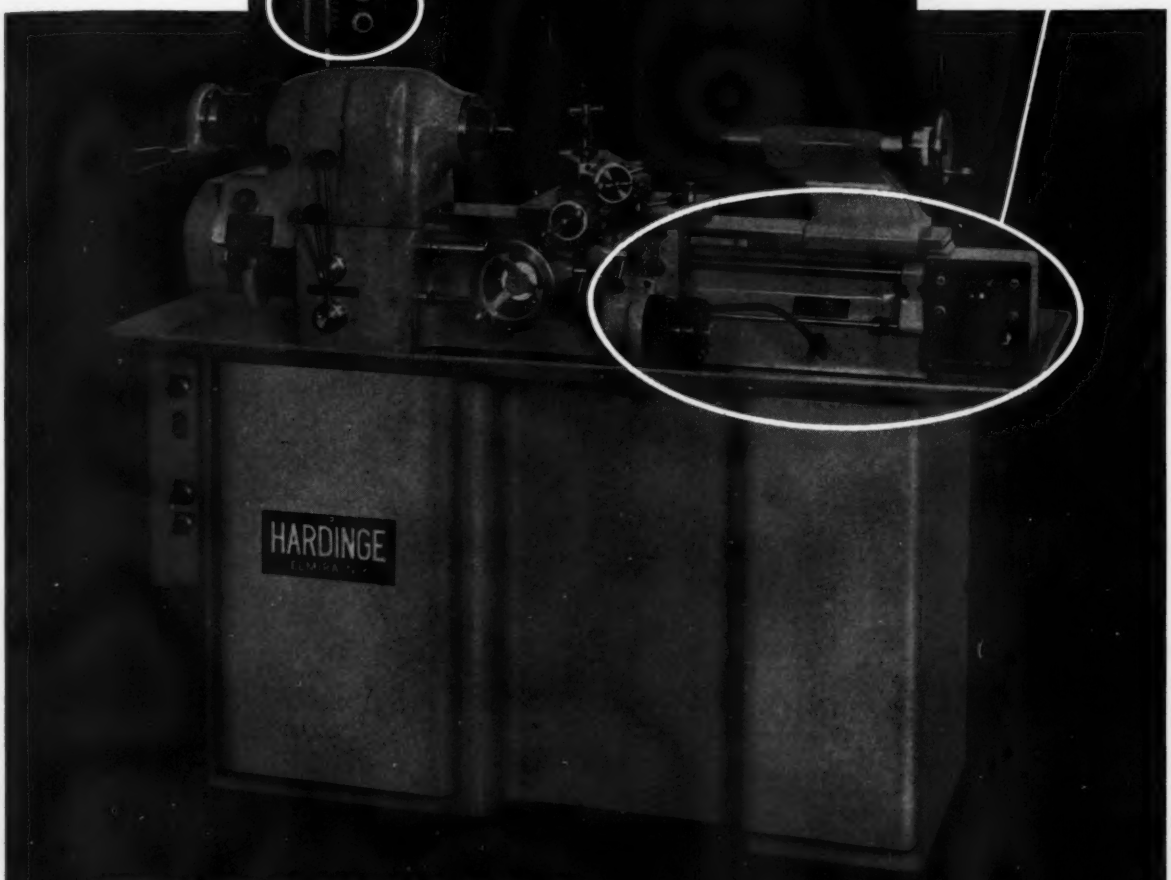

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TOOLING & PRODUCTION Magazine

The number of subjects in which T&P's editors present material in just a few issues adds up very rapidly. Most articles are of lasting interest and have future reference value in solving tooling and production problems.

This cumulative index will build up progressively during each calendar year. Each issue will carry a cumulative index of material contained in all previous issues of the same year, with each January issue carrying the complete index of the twelve issues of the previous year.

We suggest you see to it that your copies of T&P are retained for future reference so you can get the full benefit of this new, unique and useful index.

The Publisher

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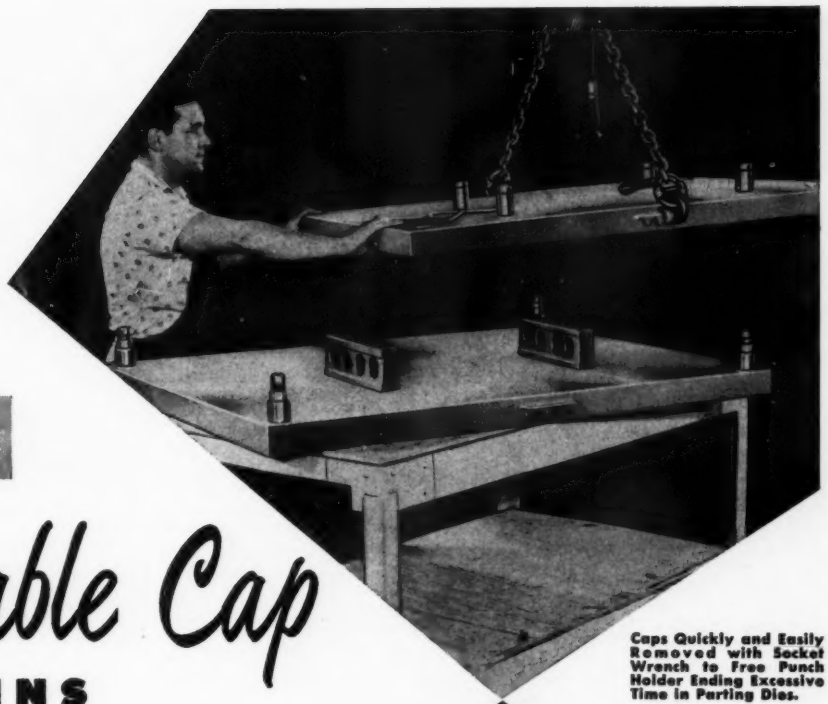

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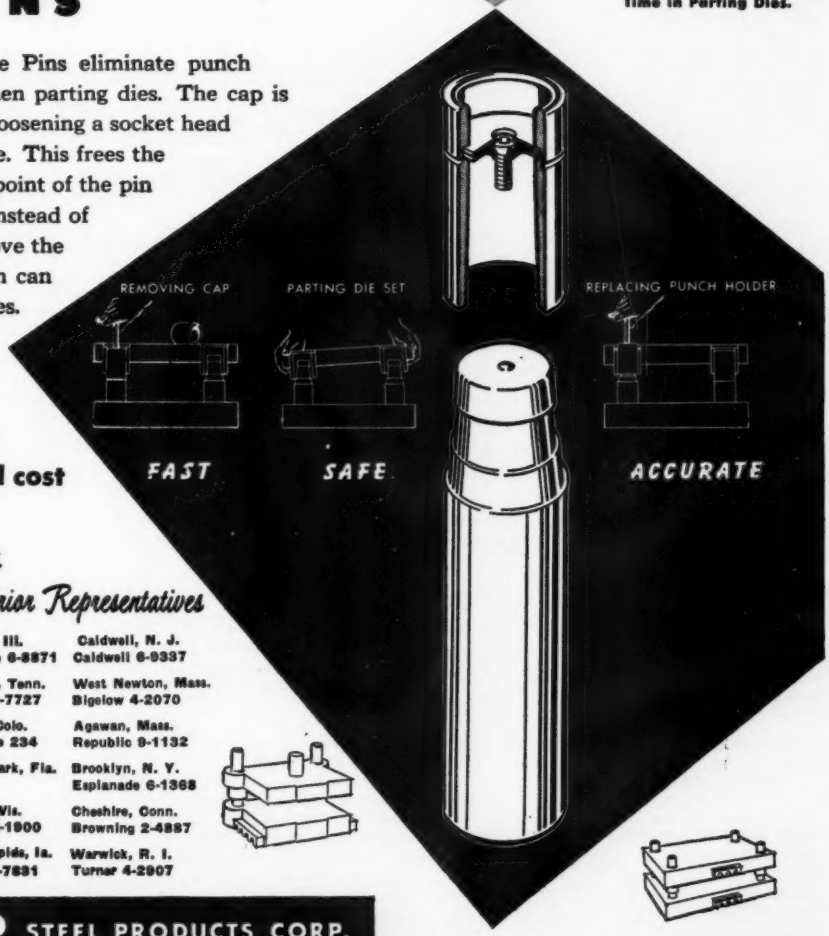

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An unusual arrangement of precision finishing operations is featured in the latest Cross Transfer-matic, which bores axle housings with differential bearing caps assembled.

In the finishing stations, the vertical boring unit first faces the shoulder and then bores the diameter for the outer pinion shaft bearing, then bores the diameter and faces the shoulder for the inner pinion shaft bearing as shown in Figure 2. Perfect concentricity and squareness of the shoulders are obtained

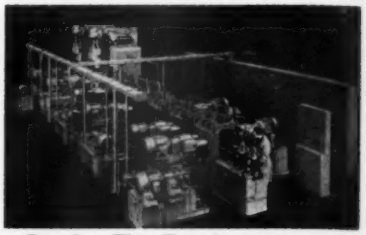

Fig. 1. This Transfer-matic performs the finishing operation on rear axle housings with differential bearing caps assembled.

between the two bearing bores, inasmuch as all operations are performed by the same spindle. At the same time two opposed horizontal units back bore the differential bearing diameters. This arrangement insures the most precise center relationship in the finished part.

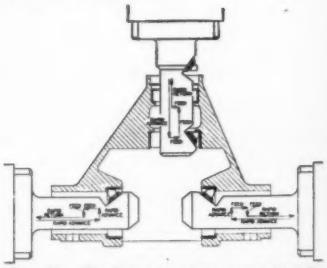

Fig. 2. Tool motions to semi-finish and finish bearing bores.

In Stations 4 and 5 of this machine, the differential bearing diameters are rough bored with multiple blade cutters. The lift and carry transfer mechanism lowers the parts over these cutters, which are loosely supported by blade like bearings. An arbor is then inserted from one side of the part to locate and drive the cutter and feed it to depth. This arrangement is necessary because the tubing bore which is outside of the bearing bore is smaller in diameter.

The Cross Machine has a rated capacity of 90 pcs/hr at 100% efficiency and each cycle produces two finished axle housings.

He proved that 1 wheel could outperform 3 at Steelcraft Tool Co.

Steelcraft Tool Co., of Detroit, used to use three different grinding wheels to grind angles on straight high speed steel form tools. Then Bay State distributor Jim Frederick, of Detroit's Industrial Abrasives Co., showed them how a single Bay State specification would cut *fast* for roughing and *fine* for finishing.

Result: Costly wheel changes were cut way down and both Roland Belardnelli, co-owner of Steelcraft, and John Kulpa, chief operator, rate the new wheel A-plus for speed and precision, too.

Your Bay State distributor may come up with more than one cost-saving idea for you. *Better grinding at lower cost—that is his business.*

Steelcraft operator John Kulpa checks performance of new Bay State wheel on high speed steel form tool job. (Guard removed for photography).

BAY STATE WHEELS of PROGRESS

BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., Brantford, Ontario.
Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. *Distributors:* All principal cities.

CIRCLE INFORM-A-GRAM KEY NO. 141

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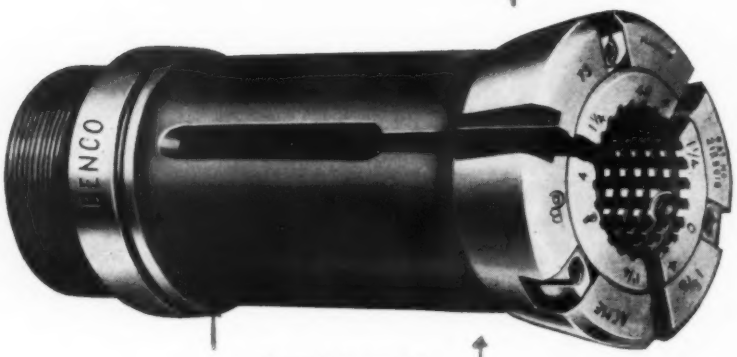
BENCO MASTER COLLETS

adds up to longer and better service life

Patented locking device prevents pads loosening from any cause.

Accurate threads with 175,000 pounds per square inch tensile strength.



Front loading pads may be changed without removing collet from spindle . . . saves set-up time.

Properly tempered alloy steel provides suitable spring action.

Hardened tapered bearing surface cam-ground to operate faster and grip tighter

Besides working better and lasting longer, these Benco "Martin" Master Collets permit you to work to closer tolerances. Their accuracy is guaranteed to be less than .001 run-out per inch of bar extension from the collet face.

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